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V. 80. No. 8 AUG 21 1922

Electrical World

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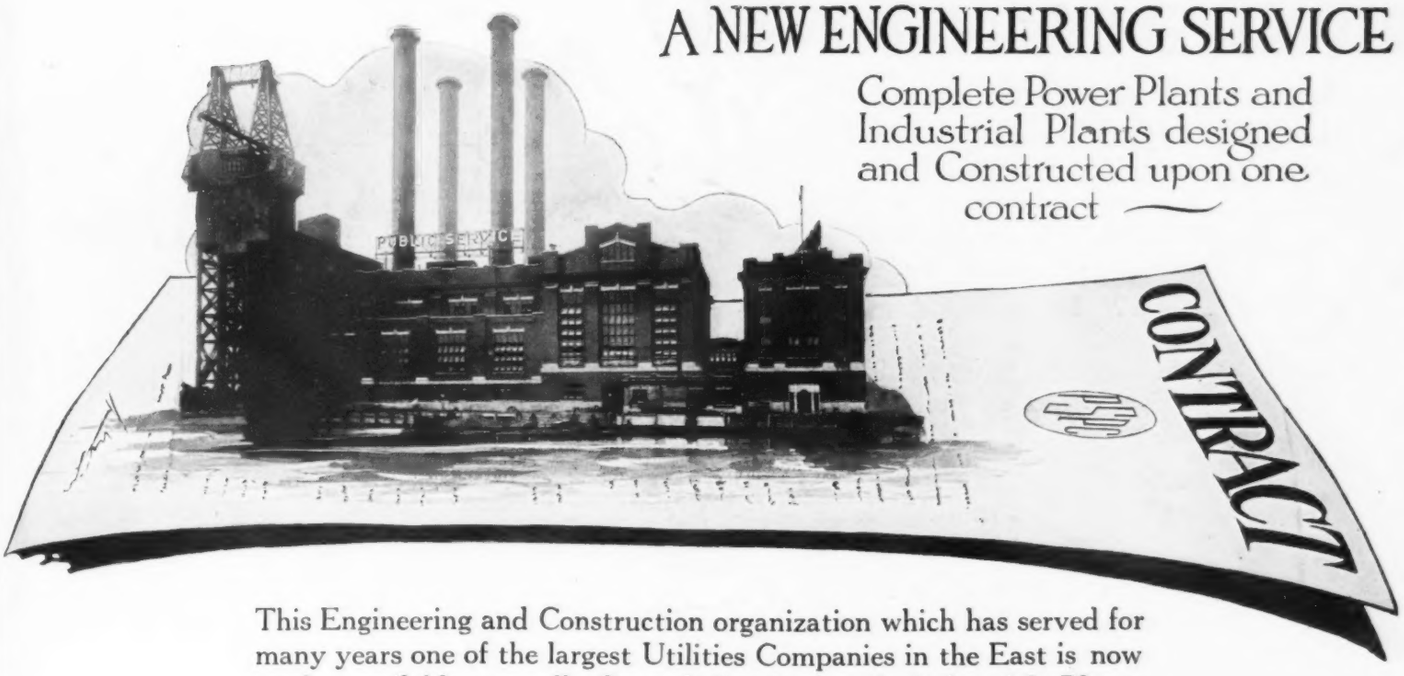

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Electrical World

The consolidation of Electrical World, Electrical Engineer and American Electrician

Published by McGraw-Hill Company, Inc.

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Volume 80 — New York, Saturday, August 19, 1922 — *Number* 8

Dreams That Come True

EVERY industry at some time or other finds itself sorely in want of old men who dream dreams and of young men who see visions. It needed not the voice of the seer to proclaim "where there is no vision the people perish," for from antiquity man's imagination has always been the means of his salvation. Civilization is indebted not so much to ideas as to ideals, for an ideal is an idea intensified—an idea shot through with beauty and animated by faith. It was the dream of a Western passage to the Indies that led to the discovery of America, and it is the dream of universal electric service that will keep our inventors, our engineers and our executives at work until the invisible genie that dwells in the coal mines and the running rivers is at every man's beck and call.

OUR industry is yet young. It abounds with men with power to see and to do those things which are essential to its upbuilding. But there is a great gulf between conception and fulfillment. Franklin with his kite coaxed the lightning from the sky, but the thunderbolts of Jove never ceased to work havoc with electrical machinery until Thomson, Wurts and Steinmetz found a way to render them harmless. Edison many years ago had a clear vision of central-station electric service, but it was only through the instrumentality of such men as Insull, Lieb, Edgar and McCall that his dream was realized. Polyphase currents were at first a day dream in the mind of Nikola Tesla, but when he told his vision to George Westinghouse it became to the electrical industry first an ideal and then a reality. Rural telephone service was for a long while a seemingly impracticable theory, but John J. Carty with his "bridging bell" put it into effect. To get the power out of falling water and transmit it as electricity to distant cities was a fond idea of many electrical engineers, and it was nothing more until H. H. Sinclair harnessed Mill Creek in southern California, but from that time onward high-tension transmission became a reality. For years the metallurgists struggled with ores which would not yield to treatment in the ordinary furnace, but in quick succession came Cowles, Bradley, Héroult and Acheson and electrometallurgy became a productive art. These are but a few examples, taken at random from the electrical industry, of men who idealized what others saw. Telegraphy, illumination, the new radio art—every branch of our industry—could be drawn on for others.

OUT of dreams has been born our modern civilization, with its widespread comfort, its material well-being, its growing opulence. The dreamers are not without honor either in their own country or abroad; but with their names must ever be coupled the names of those who make the dreamers' dreams come true—the men of affairs, sagacity and worldly wisdom who, if they themselves dream not, at least know the true dream from the false and, knowing, dare transmute it into fact. For the prophet unsupported sees only what might and not what shall be so.

William Henry Blood, Jr.

Engineer and consultant, whose distinguished services on behalf of electrical fire prevention and public utility economics number him among the foremost advisory experts of the industry.

ELECTRICAL engineering is a many-sided profession. The experience of relatively few embraces every principal branch of the industry, nor to very many men is it given to create for themselves high reputations in more than one field of technical service. To William H. Blood, Jr., electrical engineer with Stone & Webster, Inc., belongs the distinction of having worked in the manufacturing, jobbing, contractor-dealer and utility fields and acquired thereby a breadth of outlook and seasoned judgment which have exerted a powerful constructive influence upon electrical progress for virtually a generation. From one end of the continent to the other he has traveled an average of 30,000 miles per year, investigating utility problems at first hand, reporting upon proposed developments and existing situations, passing upon intricate questions of fire protection, testifying as an expert witness in commission and court cases, analyzing industrial opportunities, recommending betterments, and in general serving as guide, philosopher and friend to member companies of the National Electric Light Association through his official connection as insurance expert of the association and as advisory engineer for the great Boston organization with which he has been associated for twenty-eight years. Mr. Blood has made valuations of probably a hundred companies and has examined properties aggregating in value about two billion dollars. He has had occasion professionally to visit 180 out of 192 principal cities of the United States.

To appraise Mr. Blood's work in electrical fire prevention and measure the influence of his untiring labors upon the National Electrical Code would indeed be difficult. Certainly no other engineer in this country is more responsible for putting the grounding of secondaries upon a mandatory basis where once it was prohibited. For over a decade he has been chairman of the committee on grounding of the National Fire Protection Association and for many years has been insurance expert of the N. E. L. A. He was president of the latter body in 1905-6 and was the first president of the Electric Vehicle Association of America, serving two years in 1911-12. Always a firm champion of progress, Mr. Blood has insisted that safety go hand-in-hand with development, and his keen philosophic insight into the trend of the industry has never led him into visionary pastures. His contributions to the press embrace an extraordinary variety of topics associated with the economic, human and engineering phases of electrical development. More than 2,700 reprints of his recent paper upon "The Passing of 'Depreciated Value' in Rate Cases" have been welcomed by interested readers in circles concerned with regulation. For two years he was a faculty member of the Harvard Graduate School of Business Administration, and he still lectures upon "Public Utility Operation." He is a fellow of the A. I. E. E.

Mr. Blood was born in Boston on March 29, 1866. He was educated at the Massachusetts Institute of Technology and in 1888 entered the industry at the Thomson-Houston factory in Lynn, soon being promoted to have charge of the second floor of Factory C, assembling and testing alternating-current machinery. In 1890 he was placed in charge of the repair department of the Northwest Thomson-Houston Company at St. Paul, and from 1891 to 1894 was a partner in the Franklin Electric Company, Kansas City, building about thirty central stations and several electric railways and waterworks, and doing a contractor-dealer and jobbing business. He joined the staff of Stone & Webster in 1894 and has always held a prominent position in that organization as a consultant at every stage of its extraordinary development.

Editorial Comment

Electrical World, August 19, 1922

Volume 80 Number 8

Life on the Farm More Attractive

THANKS to electric service and the automobile, the farmer's wife is becoming more and more contented with her lot, and contentment, according to Holy Writ, is great riches. In this there is cause for rejoicing, for before we can have a back-to-the-farm movement, and such emigration is absolutely essential, there must be a stay-on-the-farm inclination. That evidently has now come to pass, for in response to the question "Do you want your daughter to marry a farmer?" sent by a Minnesota agricultural publication to farmers' wives all over the country 94 per cent answered in the affirmative. Only 480 out of 7,000 said that they were dissatisfied with their lot.

What the answer to such a question would have been a generation ago one can very well imagine. Now the home of almost every moderately well-to-do farmer is equipped with running water, electric lights, electric labor-saving devices of all sorts, a telephone, a phonograph, an automobile, and lately a radio set. Isolation, loneliness and lack of contact with the world of affairs are things of the past. The farm, the city and the great pulsating world are now linked together.

We have no desire to stress unduly the part which electricity has played in this transformation. Suffice it to say that it has been exceedingly great. It is therefore becoming more and more obligatory for electric light and power companies to extend their lines into rural communities whenever and wherever this is economically possible. Fortunately the great majority of electric light and power companies have already recognized this duty and have brought untold happiness and comfort to the farmer as well as profit to themselves. It is for the others to do likewise.

The Larger Strategy of Hydro-Electric Development and Power Transmission

WHILE some sections of the country have the advantage of high hydraulic head, they are sometimes handicapped by unreliable, insufficient or non-uniform supply. In such cases it is necessary either to preserve the flow during periods of plenty or to provide other means, generally steam plants, for helping out the supply of power during the dry season. Which of these plans of operation is the more desirable depends on the amount and kind of market and again on the facilities for storage. Now and then, as in some of the great California systems, it is practicable to back a hydro-electric plant by what is substantially complete seasonal storage, and where this can be done all the run-off can eventually be utilized, and utilized at such rates as may prove desirable for various reasons. Where such wholesale storage is not practicable and one has to be content with storage over a few days at most, there will necessarily be great loss of run-off at certain seasons, although the plant may be able to work up to a reasonable maximum on its storage water. If, however, the run-off is to be utilized without great storage facilities, the only other recourse is to overdevelop the hydraulic side of the enterprise, so to speak, and then to reinforce it by steam power. The economy of this feature depends on the certainty and regularity of the market. A good mountain stream at one end of a transmission line and a mouth-of-the-mine system plant at the other end make a combination that is pretty nearly invulnerable as regards regularity of service and general economy, given a reliable market. And right here is the place where he who plans transmission systems must be a duly certified and accredited prophet, able to see with his mind's eye what is going to happen to the mines and the rate and development of the energy market, that he may properly plan his plant for a high factor of utilization.

Young Men for Counsel

IT HAS been suggested that subordinate employees of central-station companies would profit much by being invited to attend local committee meetings as they are held in different cities by the membership of the National Electric Light Association and other associations. It is a good idea. For, although the natural limitations of space prevent attendance in too great numbers, there can be no reason for not inviting in as guests as many men from the local company as can be accommodated.

Committee meetings held in the right spirit are most valuable to those in attendance. In a sense they are short-time intensive conventions. The viewpoints of rising young men in company departments brought into fresh contact with outside minds and practices are, potentially at least, worth obtaining. The good of such gatherings to all concerned is anything but one-sided.

It will be an influence of no small benefit in preparing our young men for counsel by bringing them early into contact with questions of policy and industrial problems which they do not meet in their own work.

Making Use of the Engineer

NOT only are the place and the purpose of the engineer still very vague in the mind of the general public, but often men responsible for the management and operation of shops and plants fail to realize that engineers have very specific duties and a very definite place in the scheme of things and that it would be of great managerial advantage to make use of them in their proper sphere. The *Electrical World* has constant proofs that this condition exists in the many questions that are asked it each day, such, for example, as these: "Where can we find a general rule for figuring the proper size of motors for various kinds of work?" "How can we lay out house wiring?"—no data on the

house being given. "How can we build most cheaply a line between two points?"—distance only being given.

When a man wants to clear up a point of law he has learned to go to a lawyer. When he is ill he seeks the advice of a physician. It is true that some persons still use patent medicines without a professional prescription, and an analogous process is altogether too prevalent in the engineering field. After much grief it will always be found that in engineering as in medicine no patent nostrum can be used indiscriminately and that a thorough grounding in fundamentals and much study are necessary to solve an engineering problem with any degree of satisfaction.

Every year our universities graduate men who as their practice grows become competent to handle the engineering problems that are generally met. There also are many men who, though not college-trained, have acquired through experience equal competency to solve these problems. It is the duty of these men to see that their place in the community is understood, so that their fellow citizens in general will call for them when they are needed and mutual benefit from the application of their knowledge be wrought.

Savings Depositors Are a Measure of Industrial Stability

IN THE present conditions in the industrial and political world it is of interest to know the number of savings depositors in several nations. The United States has 100 out of every 1,000 inhabitants, Switzerland 554, Denmark 442, Belgium 387, France 346 and England 302. If one desired to measure the countries of Europe in the order of their political contentment, educational standards and the degree of industrial cooperation between capital and labor, the number of savings depositors per 1,000 inhabitants would furnish apparently an excellent yardstick.

A small financial holding determines whether or not a man is a responsible and sensible citizen or an irresponsible and envious being, readily swayed by agitators and demagogues. In order that there may be a large number of savings depositors only education is needed. To save requires foresight, and this can only be obtained by educational methods. Knowledge is power as never before. Why not attack our industrial situation intensively with an educational program?

Business Statistics for Electrical Men

IN THE year 1921 a total of 19,652 manufacturing and trading companies in the United States went into bankruptcy, with liabilities aggregating more than $627,000,000. Practically all of these failures were the results of mistakes in judgment. Thousands of other business firms also made mistakes that lost them money. And the principal reason why they made these mistakes in judgment was that they did not base their thinking on facts.

Business executives every day are called upon to make decisions involving large sums of money. These decisions are guided by the information in their possession. Too often this information is indefinite, fragmentary or distorted. The results of these decisions are molded by the influence of conditions, carefully weighed but with uncertain knowledge, and it is no wonder that disaster often follows.

There is available today to every manufacturer, jobber and large contractor in the electrical industry and every central-station executive a source of facts quite unknown to many, but of great practical value. It is the "Survey of Current Business" now published monthly by the Department of Commerce. By the use of curves, diagrams and tables this survey presents a clear, complete and accurate statistical review of current business movements, a vision of economic trends and the conditions affecting the different industries and various sections of the country. It provides the basis of an exact knowledge of the state of prosperity and the state of mind in other business circles that can be made a guide of inestimable value.

The greatest handicap to the salesman and to the executive who plans his work in the development of any enterprise is that the world is so large and the opportunity so great. There is so much that can be done that the effort is often too scattered, the butter spread too thin. And the reason is that men are apt to plan and work without an economic picture of their opportunity—that is, a broad knowledge of the conditions that are affecting their customers. Yet there are no influences more vital to a business enterprise than these movements and situations in the industries with which it comes into contact. This government statistical service for business men cannot be recommended too highly for practical daily use by the executives of the electrical industry.

Values for Rate Making

IN A RECENT talk before the Iowa Section of the National Electric Light Association John A. Reed, in reviewing the legal decisions of interest to Iowa utilities, called attention to the fact that court decisions had not yet fixed any definite price basis on which utility valuations should be made. He also pointed out that there is no mathematical formula by which such valuations can be calculated, but that the tendency of the courts is to consider original cost, reproduction cost at present-day prices, five to ten-year average costs, depreciation figures and many other factors in arriving at the fair value of a property for rate-making purposes.

The confusion existing in the matter of the proper basis of value for rate-making purposes is a matter of concern to utility men because it makes for public distrust. To add to the complexity of the situation today, there is a noticeable dropping off in enthusiasm among the advocates of the prevailing-price theory as the prices of materials drop and as it becomes evident that the theory means the writing off of considerable amounts invested when market levels were at the highest point.

Mr. Reed's position as a utility owner, and, more particularly as an attorney of many years' experience in Iowa, should give pause to the ardent advocates of any of the various theories that are proposed. The value of a utility property is finally measured by the character of the service it gives to the community. If investments are intelligently made and efficient service developed by proper management, the owners are entitled to compensation for their efforts. If investments are carelessly made and inefficient service given, the owners must suffer the penalty. This is an unalterable law of the economic world. Commissions,

courts or any other governmental agencies are powerless to change it. For this reason it is entirely probable that there will never be any one method of valuing properties established, since no method based on material and labor costs is more than an important element in the value of a property.

Service, management, the intelligence exercised in the building up of a property and all the other intangibles that go into the make-up of a business have part, and ultimately, whether the public wills or not, they will find recognition, unless it is to be assumed that the entire utility business is to go to wrack and ruin. There are too many cases in the country where intelligent management and frank dealing with the public have brought fair treatment and good returns on investment without even the mention of a valuation to allow any one to say that wrack and ruin is the only end. If a basis of proper public relations and confidence is built up, the question of the proper value of a property for rate-making purposes is quite likely to drop out of sight, since the lack of confidence caused by a policy of secrecy and a feeling, born of ignorance on the part of the public, that there are tremendous and uncalled-for profits in the utility business has been largely responsible for the prominence of the question in court and commission proceedings.

Broadcasting Experience Over Power Networks Suggests Problems for Research

IN THE carrier-current broadcasting tests that were recently carried out in Chicago and Cleveland, reported in this and the July 15 issue of the *Electrical World*, several interesting observations were made. One of the most important of them is the fact that it was possible to pick up such signals on an ordinary antenna without any connection between the receiving set and the power system. This experience is borne out by some other tests in the Middle West that have not yet been discussed publicly. The question that is raised at once is what interference will such broadcasting produce on other uses of radio. As yet there are no definite data to show how far from the power circuits the signals can be picked up. If the distance is at all great, such broadcasting would undoubtedly come into the same class as straight radio broadcasting and would be subject to all the regulations imposed on ordinary radio communication.

Another experience that seems to stand out in the Chicago tests is that the power load on the system has some effect on the transmission of the signals. Whether this applies only to such systems as that in Chicago, where power and lighting loads are handled on a tremendous scale, or whether the effect is due to the extent to which the conductors are loaded or to the characteristics of cables under high-frequency current conditions, are questions which the tests are not extensive enough to answer.

The tests made so far do indicate clearly three of the problems on which research work must be concentrated in order to make such broadcasting a practical possibility. They are (1) confining the signals to the power conductors to avoid interference with other radio traffic, (2) increasing the range of transmission in such a way that the use of the conductors for this purpose will be independent of system-load conditions, and (3) determining the optimum wave length to be used.

Balanced Load Development Is Needed

THE vice-president of one of the large business statistical organizations recently told a group of utility men that the time had arrived when central stations could no longer expect to escape the effects of industrial depressions. Looking back over the history of the past thirty years, he pointed out the fact that in all the depressions the light and power industry as a whole seemed to have escaped any dip in the curve of business development until the depression from which we are now emerging came along. While there are no indications of another slump taking place in the near or distant future, his statement calls attention to the fact that the present is one of rapid transition in the industry. In general the business of the central station up to the war had been derived to a large extent from the fields that are least affected in their activities by industrial depressions. The big field of industrial power supply was either largely untouched or supplied to a great extent from isolated plants that could shut down during a depression with no effect on the utility field.

With the war came a development that revealed the inherent advantage of an energy supply from large central sources, and the result has been a turning toward the central station that is gratifying to men who have fought for this type of recognition so long. This condition brings with it new responsibilities in the building of central-station business. In general the industry has suffered only slightly as compared with other industries during the present period of depression. An analysis of the situation, however, reveals a marked falling off of business for some of the central stations that had gone the longest distance in developing the power demand from industrial concerns and in some cases had taken on large war industry loads. The average was held up by the central stations in fields less devoted to industrial development. Fortunately in the present situation central stations were in an overloaded condition and the decrease in business was a help because of the chance it gave to catch up. Another saving factor has been the tendency on the part of industries, as they came back to partial activity, to call on the central station for their energy supply. As a consequence any available capacity has been absorbed and the central stations are still in the position of having to catch up with the enlarged demand on their facilities.

It is only necessary to imagine the condition that would have existed if the electrification of industry had been on a much more complete basis to see that the men responsible for business building in the central-station field have a real problem and a big responsibility to face in the future. That problem is the proper balancing of load taken on so that even a general depression will not affect the revenues seriously. In some cases executives who have seen the handwriting on the wall are protecting their properties by diversification of locality, selecting property units in such a way that there is a diversity of industry great enough to insure against a general slump in revenue under almost any conditions. The problem is one that must have serious study and requires a careful laying out of new business-getting policies to prevent a badly balanced load development, particularly on the part of central stations located in areas with little industrial diversity. The rapid increase in the use of household appliances is a saving element in the situation.

Developed Water Power—A Remedy for Coal Shortage

FORTUNATELY public utilities have not yet suffered for lack of coal, owing to their foresight in filling their storage yards, and, because of the coal board's program for distribution, they may not suffer even if the end of the strike is far off. Nevertheless, the present situation should make many companies think even more seriously than hitherto of depending to a greater extent on "white coal." It is a source of energy that can be relied upon more confidently than can coal because its availability cannot be destroyed by strikes or similar contingencies. Although statistics are lacking, there is no question that a number of electric service companies in the East have been saved much apprehension during the last few weeks by the ample rainfall and their ownership of water-power plants adequate to carry a good share of their loads. Permits to the extent of 2,000,000 hp. have been issued to date by the Federal Power Commission and it is probable that many more will be granted to public utilities, The goal will not be attained, however, until all these power sites are actually developed and interconnected so that adjacent territories may exchange energy in emergencies. Superpower transmission lines are not absolutely essential to this scheme. The problem is chiefly one of exchanging surplus electrical energy over short distances and a logical use of water storage facilities in the combined hydraulic and steam plant systems of the country.

Distribution at 2,200 Volts Should Be Considered for Industrial Plants

When More Than 3,000 Kw. Is Required It May Often Prove More Economical and Also Facilitate Mechanical Layout of Circuits—Compromises Sometimes Required in Practice

By A. S. WELLS
Holyoke (Mass.) Water Power Company

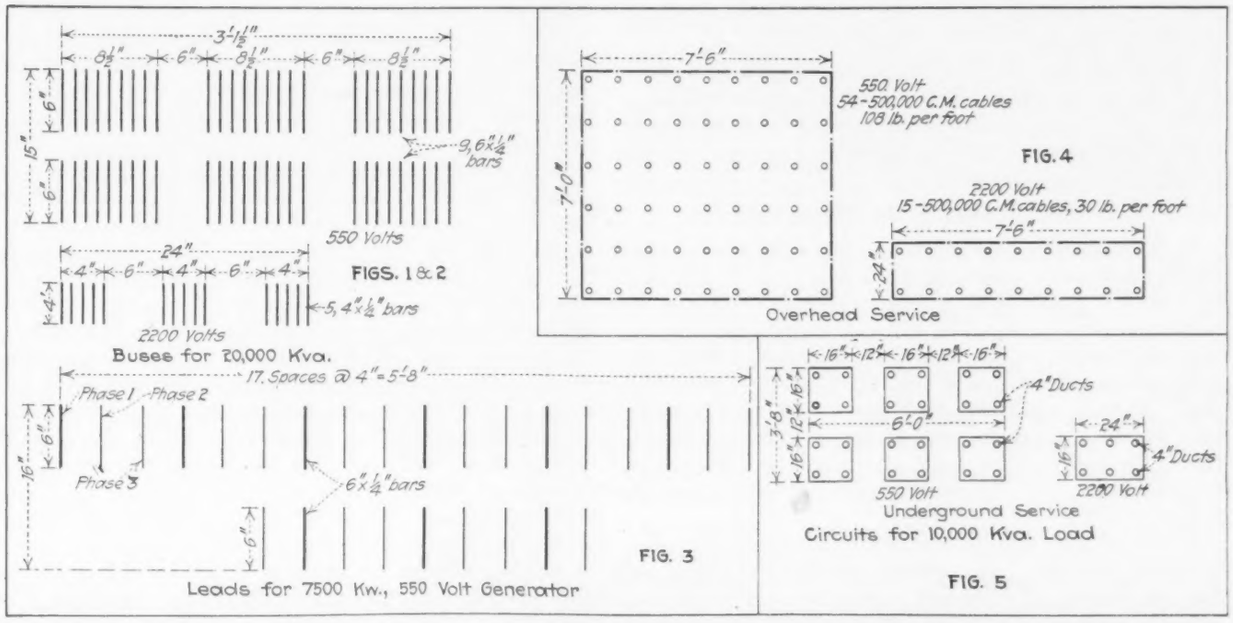
VOLTAGES higher than 550 were seldom considered in the early electrical installations in industrial plants because the total electrical load was small, the greater part of the mill being driven by direct mechanical drive from steam engines or waterwheels. As these old mechanical drives are gradually electrified and the generation of power becomes centralized many of these low-voltage systems become very unwieldy. When there is already a large investment in low-voltage equipment it is not always easy to make a change to a higher voltage, but no new installation which may develop a capacity greater than 3,000 kw. should be designed today without giving consideration to 2,200-volt distribution.

The most serious difficulty with a large low-voltage system under average industrial-plant conditions is often not so much the question of voltage drop as the purely mechanical problem of arranging and supporting the enormous amount of copper in buses and lines. Then, too, with large alternating currents the eddy currents and skin effect may be very pronounced. For instance, the writer recalls one 4,000-kva. installation in which the buses ran exceedingly hot with a current density of only 800 amp. per square inch, whereas at 2,200 volts the same kilowatts could have been carried without undue heating.

To get some idea of the relative space required for conductors at 2,200 and at 550 volts, consider, for instance, the problem at one large mill which has two 7,500-kw., 550-volt, three-phase generators and several smaller units, with a total peak load of about 20,000 kva., or 21,000 amp. Assuming this current carried in a single bus, the cross-section required is 21,000 ÷ 800 = 23 sq.in., or say eighteen 6-in. x ¼-in. bars per phase. For proper ventilation these bars should be spaced at least 1 in. apart, and with 6 in. between phases the space occupied would be as shown in Fig. 1. Taking 20,000 kva. at 2,200 volts, we would require 20,000 ÷ (1.73 × 2.2 × 1,000) = 5 sq.in. of copper, or five 4-in. x ¼-in. bars, and the space required would be as shown in Fig. 2.

The generator leads for a 7,500-kw., 550-volt machine also represent quite a problem. Cable is out of the question, so flat bus is commonly used, often with the leaves of the different phases interspersed to reduce reactance and obtain better current distribution. For such an arrangement (Fig. 3) the space required is considerable, and the designer who assumes that the generator leads can be run in anywhere after everything else has been installed may find himself in trouble.

To carry the comparison on through the system, Figs. 4 and 5 show graphically the space which would be occupied by feeder lines for 10,000 kw. at 550 volts and 2,200 volts, both underground and overhead. Providing proper space for such a group of lines as shown in Fig. 4, whether overhead, underground or through mill build-



FIGS. 1 TO 5—RELATIVE SPACE REQUIRED BY BUSES, GENERATOR LEADS AND FEEDERS FOR 2,200 VOLTS AND 550 VOLTS

ings, is no small problem if a safe, neat and efficient installation is required.

Comparing 550-volt and 2,200-volt systems solely from the standpoint of first cost, it is, of course, true that for work installed in the mill buildings much of the money saved in copper must be spent on expensive lead-sheath cable and conduit since insurance regulations require all 2,200-volt wiring to be inclosed in a continuous grounded metal-conduit system. On the other hand, it should be recognized that at 2,200 volts we are compelled to adopt a type of construction which is in the main coming to be considered good practice for 550-volt work. In other words, while the difference between the cheapest possible 550-volt installation and the cheapest 2,200-volt work may be in favor of 550 volts, the difference in cost between the first-class installations will often be in favor of 2,200 volts even for interior mill construction.

SHALL 2,200-VOLT MOTORS BE USED?

Having once decided to consider 2,200-volt distribution, the next question is whether to continue this voltage through to the individual motors or install small substations at load centers for transformation to a lower voltage. Many factors are involved in the solution of this problem, including such questions as the following:

Will the majority of motors be in sizes of 25 hp. or above?

Are there many motors already in service at a lower voltage?

Can the motors and starters be placed in dry places and protected from mechanical injury?

Can substations be located near load centers?

What will be comparative cost of the two systems?

As a matter of fact, there will always be at least a few small motors requiring 550 volts or less, and the scheme chosen will be a compromise to best suit average conditions. If the proportion of small motors is not great, a three-wire, 220-110-volt lighting system can be installed and the small motors run on the lighting transformers at 220 volts, three-phase. If most of the motors are small or a large number are already installed at low voltage, a system of 550-volt or 440-volt substations will be advisable.

The writer has in mind two actual cases which illustrate these extremes. The first installation has been in successful operation for several years and the second was a preliminary solution planned to meet future conditions.

A CASE WHERE 2,200 VOLTS PAID

In the first case a property consisting of three rather widely separated mechanically driven mill buildings, each with a single engine, was to be electrified and all power eventually supplied from a central generating station at mill No. 2. Two mills required 1,500 indicated horsepower each and the third 1,000. A very few small motors were supplied by a 150-kw., 550-volt engine-driven generator which also carried the lighting load. The new system could, therefore, be designed to fit the conditions without reference to the motors already installed.

The first step was to lay out four preliminary distribution systems: (1) 550-volt overhead distribution, 550-volt motor; (2) 550-volt underground distribution, 550-volt motor; (3) 2,200-volt overhead distribution, 2,200-volt motor; (4) 2,200-volt underground distribution, 2,200-volt motor.

In each case it was proposed to run feeders inside the mill buildings where possible in preference to out-of-door locations, and overhead lines where necessary would run over the roofs on frames rather than on poles through the yard. Cost estimates on these four propositions were as follows:

Item	550-Volt		2,200-Volt	
	Overhead	Underground	Overhead	Underground
Switchboard	$5,000	$5,000	$3,000	$3,000
Wiring	24,150	44,000	15,900	19,300
Wire towers or ducts	1,050	7,282	825	4,692
Motors, starters, etc.	13,834	13,834	16,547	16,547
Total	$44,034	$70,116	$36,272	$43,539

This analysis showed clearly that the 2,200-volt system would be cheaper. The arrangement of mill machinery was such that the use of motors in sizes from 25 hp. to 250 hp. was most efficient, and as an ultimate load of 10,000 kw. was entirely possible a straight 2,200-volt system was laid out, starting with a 2,000-kw. and a 500-kw. turbine generator and motors rated at about 1,200 hp. Existing 550-volt equipment was tied in through a bank of three 75-kva. transformers, 2,200/550 volts, and the few small motors required in the new installation were connected to this 550-volt system.

For mill No. 3, where about 1,000 hp. in motors was installed, two feeders were run, using No. 4 0 three-conductor, rubber-covered, lead-sheath conductor in conduit for interior work and No. 2/0 weatherproof for outdoor lines. At the switchboard each feeder was protected by an automatic hand-operated, remote-controlled oil switch, and from this point the cable was carried through full size to the motor-starting compensators without further protection. At the entrance to the mill, however, a non-automatic oil switch was placed in each line in a locked compartment to serve as an emergency disconnecting switch in case of trouble on the line. Workmen could also open these switches and lock the compartment door so that there would be no chance of lines being made alive through misunderstanding at the power house or by interference of unauthorized persons.

Such a simple system is, in the opinion of the writer, much better adapted to the average moderate-sized industrial plant than any combination of elaborate protective devices, because with the exception of the motor and the compensator there is no equipment outside of the power house which requires attention, while first cost is low and operation thoroughly reliable.

The second example referred to above is the case of a large paper mill which, with an ultimate electrical load of about 10,000 kw., had already installed 5,250 kw. generating capacity at 440 volts. It seemed probable that the next unit installed would be a 10,000-kw. machine, and as 440-volt generation in that size is not a practical proposition, the question arose as to just how the distribution system could best be modified to meet this condition efficiently without involving too great expense or upsetting production, the latter being especially important in a paper mill. While the present motors were nearly all in sizes 50 hp. and above, the expense of changing them to 2,200 volts did not seem justified, and, furthermore, the use of 2,200 volts would hardly have been safe for machines or operators, owing to the unavoidable splashing of water about the motors and switches and the generally damp condition prevailing.

The logical compromise was therefore a system of substations receiving current from the power house at 2,200 volts and distributing it at 440 volts. In the portion of the property already motored the secondaries of these substations would simply tie in with the existing feeders without disturbing individual motor circuits or in any way interrupting production. Equipment in substations would consist of transformers and simple switching equipment, all necessary meters being installed at the power house. No attendants would be required other than the usual troubleman assigned to each mill under the existing system. Present 440-volt generating equipment would be tied in with the new 2,200-volt bus through three-phase transformers, and there would be no low-tension switching equipment or buses in the power house, thus replacing the present switchboard with one that is much more compact, more easily operated and which is adapted for unlimited expansion.

Losses in transformers would be more than balanced by savings in transmission, and the cost of substations would in a large measure be offset by reduction in cost of the 2,200-volt switchboard as compared with one of equal capacity at 440 volts. Many new motors could be operated at 2,200 volts, thus further reducing transmission losses.

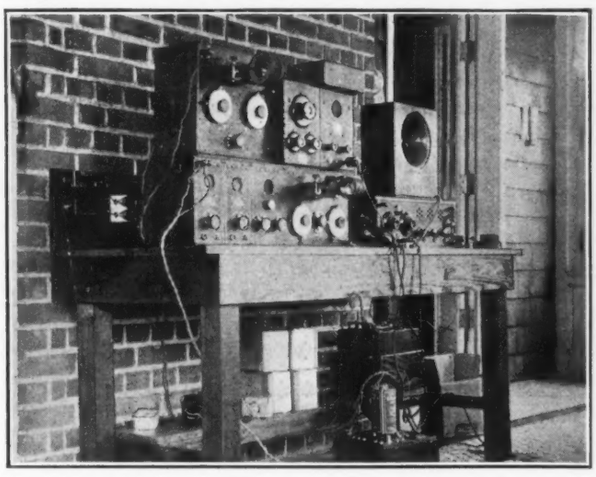
Substation compartments must in such an installation be of fireproof construction, with special provision for preventing the spread of oil fire to the surrounding manufacturing space. In general, separate houses 10 ft. or more from mill buildings would be preferable to a location within the mill, but in this particular case there was no suitable space for such an arrangement, and fireproof compartments in existing buildings were considered to be satisfactory.

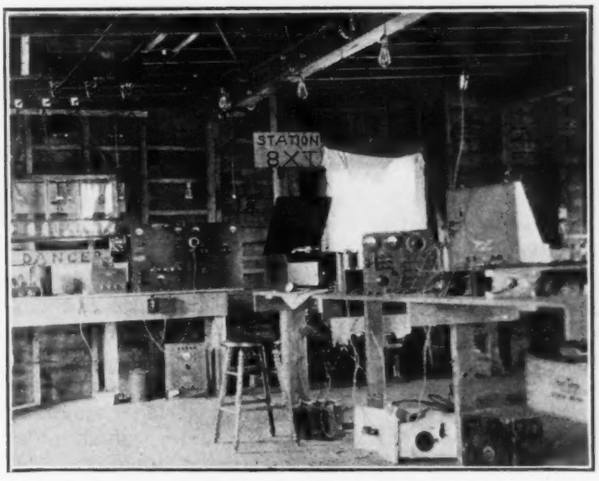
Many other similar examples could be cited, but the cases described above, although they do not by any means cover the field, are typical and serve to emphasize the need for careful study in laying out industrial power systems.

"Wired-Wireless" Broadcasting

A 50-Watt Transmitting Set Accomplishes Good Transmission Over Electric Lighting Wires—Tests Tend to Show an Optimum Wave Length for a Given System—Modification of Power Installation Not Necessary

By R. D. DUNCAN, Jr.
Chief Engineer United States Signal Corps Research Laboratory, Bureau of Standards





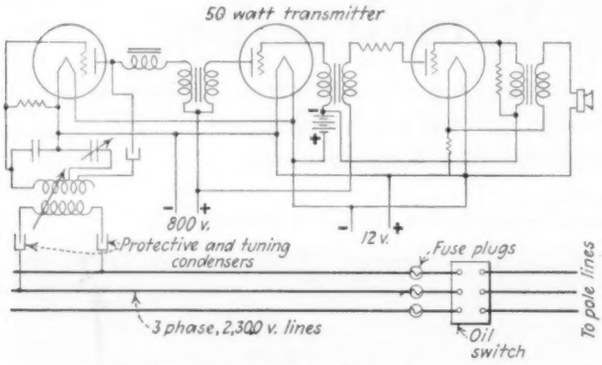
RADIO SENDING AND RECEIVING ON LIGHTING SERVICE NETWORKS INTEREST MANY CENTRAL STATIONS

THE extremely rapid growth of radio broadcasting since its start, scarcely two years ago, has resulted in such an increasing radio congestion of the ether for wave lengths in the proximity of 360 m. that both the federal government and the commercial companies have been attempting to devise means to relieve the situation. The recommendations of Secretary of Commerce Hoover's radio committee, allocating definite bands of wave lengths for certain classes of broadcasting, have been widely published and are a step in the proper direction.

Another method by which such congestion may be greatly relieved, suggested by Major-General George O. Squier, Chief Signal Officer, U. S. A., is that of broadcasting by "wired wireless" over existing electric lighting and power wires. Wired wireless, which is an invention of General Squier, is a form of directed radio transmission and in this particular instance consists merely in substituting for the radio antenna at both the transmitting and receiving stations the electric light wire network. The terminal apparatus is in general similar to standard radio apparatus. By this means the radio energy is not radiated in all directions into space, only a small portion of it reaching the desired recipient, but is directed to flow along a definite plane directly into the customer's home. Such a system would effect a great conservation of energy, making possible the use of small transmitting powers and, with the proper choice of wave lengths, would result in operation with the minimum radiation.

In other words, it should be possible to broadcast into an electric light socket and to plug the receiving apparatus into a similar socket, just as we now do an electric iron, toaster or other familiar electrical appliance. This is precisely what was done in Washington. During the months of March and April, at General Squier's direction, the writer conducted a series of experiments over the light wires of the War Department building and, in co-operation with the Bureau of Standards, over the lines of the Potomac Electric Power Company in Chevy Chase, D. C., during which music and speech were successfully broadcasted into and received from the 115-volt lines.

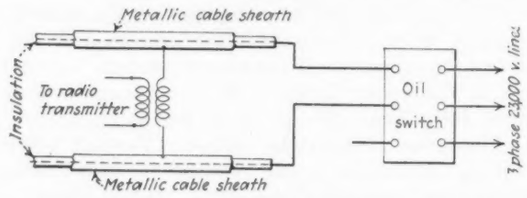
The possibilities of such a system of dissemination of information and its probable effect upon the electric lighting industry were so apparent that the North American Company of New York City, which operates the public lighting utilities of a large number of cities, offered the facilities of its systems to the Signal Corps for further experiment. During the month of May, in co-operation with the North American Company and the Cleveland Electric Illuminating Company, very successful wired-wireless broadcasting was accomplished over the lines of the latter company in Lakewood, a suburb of Cleveland.



PROTECTION FROM HIGH VOLTAGE WAS INSURED BY USING CONDENSERS

In the Cleveland experiments the transmitter was placed approximately 1½ miles from the Lakewood substation and was arranged so that it could be operated either into the 115-volt lines or into one set of the 2,300-volt, three-phase feeders. The major portion of the distribution system in Lakewood is aërial, though all lines enter the substation through underground cables of varying lengths. The transmitting apparatus consisted of a 50-watt unit, utilizing the plate system of modulation operating through specially designed transformers. The receiving apparatus consisted of a coupled circuit tuner, a vacuum-tube detector and a two-stage audio-frequency amplifier. During most of the tests the receiving circuit was purposely maintained in the non-regenerative condition so that the only amplification obtainable was that due to the amplifier.

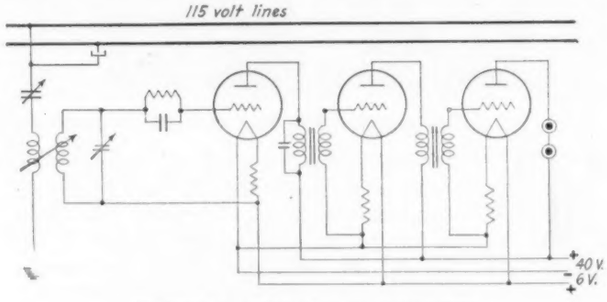
Different methods of connecting the transmitting and receiving apparatus to the lines were tested. The most successful results were obtained with the transmitter connected between any two of the three-phase, 2,300-volt lines and with the receiving apparatus connected between the 115-volt lines and the ground. Apparently there was sufficient induction between the high-voltage conductors on the pole line or capacity coupling in the underground cables immediately adjacent to the substation to insure that, so far as reception was affected, it would not seriously matter to which two of the three high-voltage wires the transmitter connection was made. On overhead lines protection from the high voltage was obtained by means of protective condensers, which also served the purpose of tuning. A second method of



THE CAPACITY BETWEEN CABLE CONDUCTOR AND SHEATH CAN BE USED FOR COUPLING

connection, which is especially effective where transmission lines of the higher voltages are used, employs a section of a high-voltage cable in which the capacity between the metallic cable sheath and the conductors is employed for coupling instead of specially introduced protective condensers. The receiving apparatus was either plugged into the light socket or connected to the 115-volt lines on the pole, depending upon the particular location of the receiver. Ground connection was effected in the normal way.

Five wave lengths—viz., 350, 420, 710, 3,800 and 13,000 m.—were tested. Of these the three lower gave neither consistent nor dependable results when received at different points on the lines. Furthermore, on the short wave lengths there was appreciable radiation from the lines, as was evidenced by the fact that fair radio reception was obtained on an antenna several miles from the transmitter. The latter result is more or less contrary to certain theoretical predictions which have been made relative to radiation from transmission lines at high frequencies. To reduce the radiation effect and also the attenuation or linear dissipation of the useful high-frequency energy, which should decrease with increasing wave length, the wave length was increased first to 3,800 m. and then to 13,000 m., of which 3,800 m. gave the best results both as to the quantity of speech received and as to the quality of modulation. Assuming the transmitter conditions to be the same for both wave lengths, this would indicate the existence of an optimum



RECEIVING APPARATUS IS CONNECTED TO A CONVENIENCE OUTLET

wave length for the particular distribution system operated on. It points to the possibility of the existence of similar optimum wave lengths for other transmission systems. Time did not permit investigation of the region of wave lengths between 3,800 m. and 13,000 m. to settle this point more definitely.

Further to investigate the radiation effect, wherever

possible careful comparison was made between reception over the 115-volt lines and on an antenna. On the 3,800-m. and 13,000-m. tests and with the same order of magnitude of line current obtained at the shorter wave lengths the very faintest reception was observable on the antenna at certain times only. With the same receiver conditions a good quantity of speech was receivable from the lighting wires. This result was obtained on a number of tests, and it is believed it is perfectly general.

Receiving tests were made at seventeen different localities within the suburb of Lakewood, there being in some cases a number of repetitions of tests. The greatest air-line distance from the transmitter was approximately 4 miles. However, judging from magnitude of speech received at this point, this distance could have been materially increased. Special pains were taken to receive on feeders differing from the one to which the transmitter was connected, thereby necessitating that the received high-frequency energy be transmitted back through the substation and out again over a different feeder, through the step-down transformer and into the home containing the receiving apparatus. When transmitting on 3,800 m. every test that was made in the Lakewood district yielded positive results.

It is to be noted that throughout these experiments no changes were made or required in the transmission system. Contrary to the belief which seems to prevail, no bypassing condensers or circuits of any description were required at the hundreds of transformers scattered along the lines. If the transformers did not function in their natural manner, there was apparently sufficient capacity between the primary and secondary windings to afford a low reactance path to the high-frequency currents. Furthermore, owing to the low transmitting powers required, the high-frequency voltages applied to the lines were very low and subjected neither the lines nor the equipment to damaging influences.

The conclusions which may be drawn from the Washington and Cleveland experiments are that, from a technical standpoint, wired-wireless broadcasting over electric power wires is entirely feasible, and that with the proper choice of wave lengths the radiation from the lines may be reduced to such an extent that it will not interfere with present radio communication. The experiments which have been made were limited in their scope and have been confined mainly to two cities.

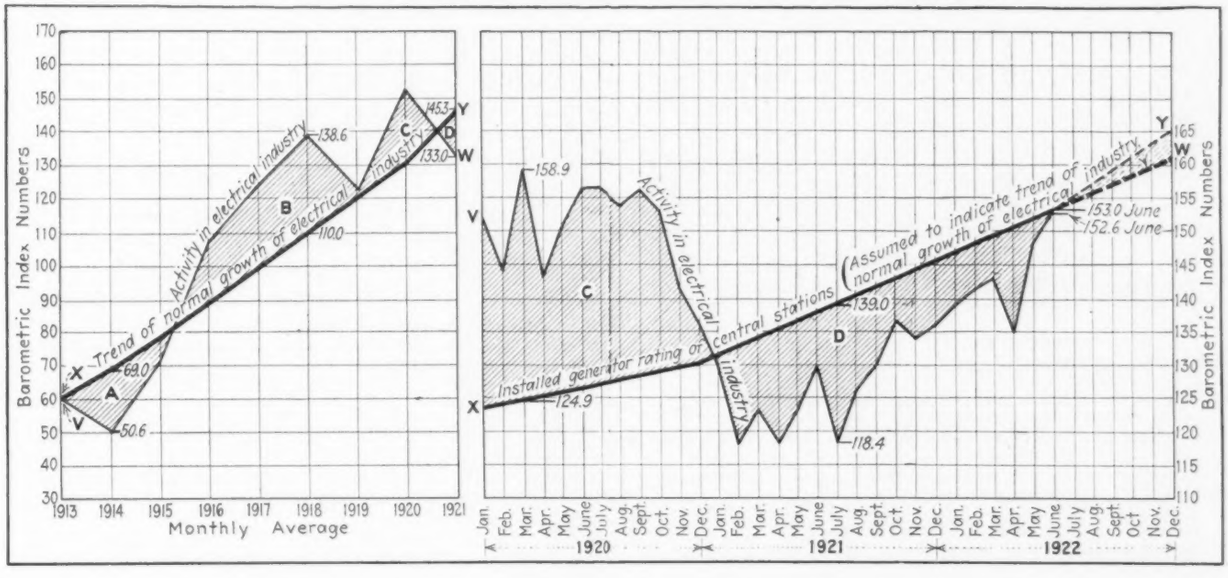
The writer wishes to acknowledge the interest and support shown in this investigation by Major-General George O. Squier; also the co-operation of the North American Company of New York City and the Cleveland Electric Illuminating Company.

Labor Troubles Affect June Electrical Business

INDEX figures upon which the *"Electrical World* Barometer of Business Conditions in the Electrical Industry" is based indicate that during June further advances were not so great as in the preceding months. A part of the falling off was no doubt due to seasonal slackening, but more potent causes were the long-continued coal strike and the uncertainty connected with the railroad difficulties. Preliminary figures for June indicate, however, that the operations of the electric light and power branch of the industry broke all former output records by more than 80,000,000 kw.-hr. Although a large proportion of this increase in output by the central stations of the country was undoubtedly due to the addition of tens of thousands of new residential lighting customers during the month, the fact remains that only one of the primary industries which are the largest consumers of electrical energy reported decreased activities during June as compared with May.

The *"Electrical World* Barometer" indicates that during the month of June business conditions in the electrical industry taken as a whole showed an increase of 4.3 points on the barometer scale. The electrical industry as a whole during June was operating at only four-tenths of a point below what would have been the point of seasonal demand if growth in the industry had been normal. In May it was operating at four points below the point of normal demand.

ELECTRICAL WORLD **BAROMETER OF ELECTRICAL BUSINESS CONDITIONS**



The Principal Forms Which Are Used in the Stores System of the Oklahoma Gas & Electric Company

RECORD OF DELIVERIES
SUPPLIES RECEIVED RECORD AND COST ANALYSIS
STOREROOM CHARGE No. 27906
STOREROOM CHARGE No. 27906
SUMMARY OF STOREROOM CHARGES
RECAPITULATION OF SUPPLIES ISSUED
INVENTORY
Oklahoma City
DIVISION
STATEMENT OF MATERIAL AND SUPPLIES ON HAND, RECEIVED AND ISSUED. MONTH OF December 1931
CARRIED IN GENERAL LEDGER AS Material and Surplies ACCOUNT
APPROVED STORE KEEPER
OKLAHOMA GAS AND ELECTRIC COMPANY
DAILY INVENTORY
STOREKEEPER: PLEASE TAKE A CAREFUL PHYSICAL INVENTORY OF THE ITEMS LISTED BELOW AND RETURN THIS SHEET TO THE OFFICE TODAY
NAME OF ARTICLE
TO BE COMPLETED IN OFFICE
STOREKEEPER
TOTAL
FIG. 1
FIG. 2
FIG. 3a
FIG. 3b
FIG. 4
FIG. 5
FIG. 6
FIG. 7

1. Reverse side of the purchase order on which "material received" data are entered. 2. "Supplies received" record and cost analysis. 3a and 3b. Storeroom charge form on which material is issued from the storeroom. 4. Daily summary of storeroom charges. 5. Recapitulation of supplies issued which is balanced weekly with the daily summary of supplies issued. 6. Monthly inventory of supplies on hand, received and issued. 7. Daily inventory on which items for inventory are listed to be checked. This is the method by which a constant check on the stock is kept. Ten or more items are checked daily and give a good indication of the daily condition of all the stock.

Co-ordinating Material Handling

Handling of Materials on Oklahoma Properties from Receipt to Disbursement and Final Accounting Average Costs of Any Material Item Used in Pricing Stores Requisitions

By PAUL HOHEISEL
Accountant Stores Department, Oklahoma Gas & Electric Company

IN AN article in a recent issue of the *Electrical World* the basic organization of the material-handling system of the Oklahoma Gas & Electric Company was discussed. But the success of any storeroom system is dependent naturally upon the ease and regularity with which it operates, and the problem of co-ordination is as important as the basic plan itself. It is essential, therefore, to a full understanding of our method of handling materials and supplies that the actual routine be described in detail. It is as follows:

Material Receipt Routine.—Exceptional care is given to the receipt of materials, and except for such items as are delivered directly to the job on which they are to be immediately used, all material is received at one point. Weights and quantities are verified and the quality is inspected. The receiving copy of the purchase order (Fig. 1) in duplicate is sent to the storeroom file, and the quantities, descriptions and proportional weights are listed on the reverse side. The material is tagged and placed in its proper bins according to the stock symbol provided by the storeroom office prior to sending the copy of the purchase order to the receiving department.

All freight or express charges are attached to their sustaining purchase order and after completion in the receiving department are sent to the store office. The follow-up copy of the purchase order is then removed from the storekeeper's file and matched, and both copies of the purchase order are approved by the storekeeper and distributed to the "material and supplies" account.

From there they are sent to an invoice clerk, who enters the data from the reverse side of the receiving copy in a receiving ledger (Fig. 2), and the shipment is given a receiving number according to the order of its receipt in a particular month. For example, the tenth receipt in December is numbered as "12-10." This receiving number is entered on both copies of the purchase order, which are then filed alphabetically as to the vendor until invoices are received.

Receiving Ledger Must Balance

As the invoices are received they are matched with their proper purchase orders and entered in the receiving ledger, under the head of the receiving number as shown on the purchase orders. After entry they are stamped as entered, certified by the storekeeper, and the invoices with one copy of their order attached sent to the voucher department for payment. As the vouchers are paid they are debited to "material and supplies." Thus at the close of the month's business the receiving or cost-analysis ledger must balance with the totals of the vouchers issued. The receiving copy of the purchase order is retained at the storeroom and filed for future reference.

A petty cash account is handled by the storekeeper for the payment of freight and express bills. These are carried through the receiving ledger in the same manner as invoices and applied against the proper materials. As the entries of these are completed, they are sent to the voucher department, the storekeeper is reimbursed and the "material and supplies" account is debited.

After the invoices and expense bills of a shipment have been passed for payment, the amounts charged in the receiving ledger against the received articles are totaled and entered in the stock ledgers under the proper account. This account is the same as the one designated on the purchase order at the time it was first received and entered in the ledger from the receiving sheet.

Material Disbursement.—More trouble and inefficiency can exist in the disbursement of materials than in any other branch of storeroom routine. Extra effort has been made to provide detailed bin cards and card indexes whereby ready reference to the contents may be had and to see that the proper stock numbers or symbols are clearly shown on all requisitions or charges sent for pricing and deduction from the stock records.

Nothing is allowed to leave the storeroom without proper authority for disbursement. This authority is in form of a storeroom charge slip (Fig. 3), presented in duplicate and signed by department heads or their agents.

Use Price Books

As the stores clerk removes articles from a bin in filling an order he enters before each item on both copies of the storeroom charge the stock symbol as shown by the bin card. As the material is delivered to the messenger he is required to sign for receipt of the material, and the stores clerk signs to show delivery.

Each morning the price clerk sorts through the charges of the previous day and ascertains by the stamped numbers that all charges have been received by him. The charges are then divided according to departments, priced and extended.

The prices are obtained from price books, which are small and easily handled and eliminate the inconvenience of the heavy ledgers. Each month the stock ledgers are analyzed to obtain new unit prices and the receipts, both quantities and amounts, are added to the previous month's balance on hand. From these are deducted the disbursements, and the remaining quantity or balance on hand is divided into the amount on hand. The quotient gives the average unit cost.

This method works well in practice, and all values are absorbed when material is exhausted. In pricing, the average cost is used from one period of analysis to the other, with the exception of cases where stock becomes depleted in mid-month and a new consignment is received. In such a case the new actual cost is used for pricing for the balance of the month.

In pricing and extending the amounts are shown on both the original and duplicate storeroom charges and when all extensions have been totaled the charges are numbered consecutively with a series which begin anew the first of each year. By this number the storeroom charge is identified in future transactions. The originals and duplicates are separated, and the totals of the original are listed on a "Daily Summary of Storeroom Charges," form (Fig. 4) in the column of the account under which the material is carried. The total of this sheet represents the day's disbursements. After listing, the original charges are taken to the departments from which they were issued and approved by the department heads and upon return they are attached to the summary sheet and sent to the general office for distribution.

The duplicate charges are then posted as to quantities and amounts under their proper accounts in a "Recapitulation of Supplies Issued" book. This book (Fig. 5) is composed of large blocked sheets each capable of handling from one to twenty-five accounts, depending upon the number of disbursements on an article. The arrangement of the sheets and accounts are in most cases in the same order as the stock ledgers, though deviations are made by the posting clerk.

WEEKLY POSTING PRACTICED

Each block on this "recap" sheet is numbered and bears the description and symbol of the account. Postings are made from the charges showing the charge number, quantity, amount and date. Once a week these postings are totaled and balanced with the week's disbursements as shown by the "Daily Summary of Storeroom" charges. The totals are then transferred to the proper accounts in the stock ledgers under the columns of "material checked out." With the final posting the stock ledgers will show the same amounts as that which has been applied against the various operations by the cost-accounting department. In the totaling of each account in the recapitulation book the clerks are instructed to ascertain the relations of the quantity and amount of each account, and the unit prices established should when multiplied by the totaled quantity equal the totaled amount. The cause of any noticeable difference can therefore be at once found and the proper corrections made.

Monthly Inventory Report.—At the close of the month's business, after all postings have been made from the receiving ledger and "Recapitulation of Supplies Issued" book to the stock ledgers, the transactions of each account are analyzed and summarized to arrive at a new balance on hand. This is done by adding the previous balance on hand to the total receipts and deducting the total disbursements, which will leave the new balance on hand. The quantity balances are then divided into the values for the establishment of the new unit prices.

The transactions are then entered on a large statement or inventory sheet (Fig. 6) which contains the names and symbols of every item in the "material and supplies" account, in the same arrangement as the stock ledgers. The descriptions or names are "shapirographed" so that a six months' supply of sheets can be made at one typewriting. The sheets of each classification of the stock account are totaled separately, permitting a distinct report to be made of each, and the classifications when recapitulated give the standing of the entire "material and supplies" account.

Transient Stores Account.—This account is provided to accommodate the handling of incidental items purchased for immediate use, the purchase of which usually originates with the department heads. In this case requisition is made on the purchasing department by the department head and a copy is sent to the storeroom. Attached to the storeroom copy is a storeroom requisition debiting the account for which the material is to be used. This charge is then attached to the receiving copy of the purchase order, and both are sent to the receiving department.

TRANSIENT LEDGER USED

When the material is received it is checked in the same routine as "material and supplies," and labeled with a green tag, designating that the material is not in stock and also the work to which it has been charged. It is then held for demand from the proper department, and the receiving copy and storeroom charge are sent to the invoice clerk, who enters the data in a "transient stores receiving" ledger. A receiving number is given the shipment just as with "material and supplies," only prefixed by the letter "T," and upon receipt of the invoice proper entries are made and the total of the invoice entered on the storeroom charge. The invoice and charge are stamped "transient stores" and sent to the voucher department. From the voucher department the charge is sent to the cost-accounting department, where the work is charged and the account credited.

Unclassified Construction Supplies.—This account contains the cost of all electric meters and transformers, gas meters and regulators. The methods of receipt, disbursement and accounting are the same as those for other materials, and a special stock ledger is maintained so that more suitable accounting relations can be maintained with the general office construction books.

Perpetual Inventory.—In order that a close check may be kept on the material, the storeroom office daily provides a list of ten or more articles (Fig. 7) on which a count is taken, and these lists are then compared with the records. Any shortages or "overages" are investigated and the differences adjusted. By this perpetual inventory a much closer balance is maintained.

Handling of Salvage.—Very little material of salvage value is returned to the storeroom with the exception of copper wire. The department employs an old lineman whose duty it is to sort through the salvage wire and to select usable lengths, splice them and form them into coils, and these coils are taken into stock, the proper removal order being credited. The amount of wire that can be reclaimed for further use is surprising.

Shipping of Materials to Branch Stores.—The branch stores make requisition on the purchasing department for materials needed. The purchasing department refers the requisition to the central store, and if in a position to handle it, the central store requests a shipping order from the general office containing the quantity and the description of the requisitioned articles and instructions for forwarding. Three copies are received by the storeroom. At the time of shipment a storeroom charge is made debiting the branch store, and the amounts as shown by the storeroom charge are entered on two copies of the shipping order. One copy is sent to the general office for billing while the other priced copy is held for file. The third copy of the shipping order is immediately sent with the bill of lading to the consignee for identification of the shipment.

Present-Day Practice in Making Cable Joints

Composite Opinions of Experts on Various Phases of Cable Joining—Careful Workmanship Considered More Important than Methods Employed—No Uniformity of Practice Indicated

STEPS in the process of making high-tension cable joints which demand the most attention of manufacturers and operators were emphasized in a symposium held at Niagara Falls, Ontario, during the recent convention of the American Institute of Electrical Engineers, under the auspices of the cable research committee. Virtually every shade of opinion was expressed by experts in cable joining, and the views of engineers supervising the highest-voltage underground systems in this country were expounded. The discussion showed a great diversity of opinion regarding the methods which should be used, indicating that considerable investigation and observation must be undertaken before operators as a whole will accept any specified method of making joints as the best. It was many times reiterated at the meeting that the satisfaction obtained from any joint is dependent more upon the human factor and care employed than on the method of making the joint. Several methods, if properly employed, will give good results and minimize failures at the joints. Operators who were not fortunate enough to be at this meeting should find valuable information in the following report:

Marking of Conductors.—The marking of conductors, which can be done readily enough by the manufacturer, for the purpose of facilitating connection of wires of the same marking, was discussed briefly. The consensus of opinion seemed to be that it is difficult to handle in such a manner that similar wires in abutting cables will come together without twisting the cables considerably and making non-uniform splices. Abroad nearly all cable conductors are marked, however little attention is paid to the markings when the cables are installed. It was brought out that the polarity of cables can be taken care of more easily by making so-called cross joints in the cable system.

Copper Sleeves.—According to a written communication from R. C. Powell of the Pacific Gas & Electric Company, the copper connectors carry practically all the current between the ends of joined cables. This observation was based on tests in which a piece of asbestos was placed between the abutting ends of conductors and the conductivity of the joint made in this manner compared with one in which the abutting ends of the conductors were in contact. Present practice indicates that the actual cross-section area of the copper sleeves should be somewhat larger than the conductors joined, figures having been given indicating 2 to 25 per cent greater area.

The necessity of properly tinning the conductors before making a joint in order to avoid heating and consequent failures was emphasized by Mr. Reid. On the other hand, N. E. Buck of the Commonwealth Edison Company brought out the fact that, with sector cable particularly, it is difficult to form the conductors, tin them and put them in a sleeve without having a loose sleeve. His practice is to insert the conductor in a sleeve with a "V" slot opening into which the solder is poured.

According to the opinions expressed, the general tendency is to use copper sleeves not shorter than 2½ in. and to lengthen them as the size of the conductor increases.

Soldering.—A great variety of soldering fluxes are used and in general the results obtained therewith have been satisfactory in so far as avoidance of corrosion is concerned. The most common cause of trouble in soldering joints is carelessness in removing surplus solder rather than in the use of fluxing compounds.

Heat Destroys Insulation

Conductor Insulation.—The majority of speakers expressed themselves in favor of "stepping back" or "penciling" the insulation on each side of the copper connectors after soldering the joints in order to remove the effects of the hot solder on the ends of the insulation, to provide a long creepage surface and to facilitate the application of insulation without creating air pockets. A. F. Hovey, Standard Underground Cable Company, declared that the space between the end of the conductor and insulation should not be more than ⅛ in. to ¼ in. because the cable insulation is the best that can be applied. This space should be filled with linen twine saturated with paraffine and wound very tight. In applying tape to the stepped insulation E. B. Meyer, Public Service Production Company, said that his company uses black cambric tape, petrolatum being applied between each layer. The necessity of penciling the insulation depends on the kind of compound used, said D. D. Clarke, Kansas City Light & Power Company. With non-flowable compounds there is no trouble, but with flowable compounds there is liable to be unless the insulation is penciled.

The importance of carefully handling the material used in insulating joints was emphasized by Mr. Reid, who maintained that the quality of workmanship is the most important factor in obtaining good splices. With proper supervision of well-trained joiners it is possible virtually to eliminate all joint failures. Compared with workmanship the kind of compound to be used is of small importance, it being possible to obtain satisfaction with almost any insulating compound, provided that the joint is well wrapped.

A hand-wrapped joint which has given excellent satisfaction on the Detroit Edison Company's 23,000-volt system was described by A. A. Meyer of that company. The joint is made under very complete instructions and close supervision. Careful precautions are taken, such as leaving the tape in the compound until applied, warming the tape and keeping it warm, preventing

foreign material from getting into the insulation, and careful cutting or penciling of the insulation. A special tool is used for this last operation. A large part of the secret in making a good joint, Mr. Meyer declared, is in perfect penciling of the conductor insulation so as to avoid air pockets. Besides, the compound is carefully tested for coefficient of expansion, melting point and dielectric strength.

Two general opinions were expressed regarding the relative merits of hand-formed and machine-formed joints. Speakers in favor of hand-formed insulation, while admitting that considerable supervision is necessary in order to insure high-grade workmanship, expressed the belief that good results can be obtained by close supervision and that dependence on the quality of the compound can be eliminated to a great extent. On the other hand, those in favor of the formed insulation prefer eliminating, as far as possible, the human element in the making of splices and favor depending upon high-grade insulating compounds for results. Experience of the last ten years has proved that such compounds can be secured.

Filling Compound.—In Cleveland, said C. N. Rakestraw, it is the practice to start new splicers on 11,000-volt joints instead of the lower-voltage type, because the personal equation in the former is of minor importance compared with the quality of insulating compound, whereas the workmanship necessary in the lower-voltage splice must be of a high caliber.

In order to eliminate joint failures it is necessary to have a compound that will neither crack nor flow, according to D. D. Clarke. In eitner case an air pocket may result which will be followed by corona and eventually by trouble. It is a mistake to think that hard compounds are always brittle and that soft compounds are plastic or non-brittle. Investigation has often shown that the hardness of the compound has little to do with its brittleness. Some compounds, when very hot, may be soft and still brittle, while other very hard compounds will not break readily.

On the other hand, N. E. Buck contended that a compound which will flow very slightly will give the best satisfaction under all temperatures according to his experience. Compounds that are too soft tend to migrate under high temperatures and those that are too hard will crack at low temperatures.

When selecting insulating compounds, said W. H. Cole, Edison Electric Illuminating Company of Boston, it is necessary to distinguish between joints which have machine-formed insulation and those having hand-formed insulation, since the duties to be performed by the compound are very different. In hand-insulated joints wrapped by careful workmen a compound with low dielectric strength may be satisfactory as it has but little duty to perform. On the other hand, with machine-formed insulation the duty of the compound is of greatest importance, and it is therefore necessary that the compound have proper characteristics as to fluidity and dielectric strength in order to obtain satisfactory operating results.

The importance of boiling out joints was emphasized by A. O. Hoeftmann, American Steel & Wire Company. This is done by pouring hot paraffine onto the conductor insulation before wiping the lead sleeve in order to remove any moisture left by the hands of the joiner. The paraffine is allowed to run over the joint until no bubbles appear.

The Commonwealth Edison Company also makes a practice of boiling out its cable joints, according to Mr. Buck, compound being poured into the joint through a funnel at the lower end and allowed to flow out an opening at the high end of the joint. The compound is allowed to flow over until no bubbles appear, about one gallon or so being sufficient.

Originally, all 15,000-volt cable joints in New York City were hand-made, according to Philip Torchio, New York Edison Company, but owing to the large number of failures it became necessary to devise some other method of making joints. The vacuum joint which was developed is shown in the accompanying illustration. Excellent results have been obtained with this joint which well warrants the additional expenditure. One important advantage of this joint is that it saturates the cable for quite a distance back from the joint. The vacuum process of making joints is essential in high-tension work, declared Mr. Torchio, but with voltages below about 10,000 a good splice can be made with either formed or hand-wrapped insulation without employing the vacuum process.

Removing the air from a cable joint and providing a reservoir for the compound are both essential factors in making satisfactory cable joints, H. C. Dean, New York & Queens Electric Light & Power Company, agreed. He suggested that on cables with a decided grade it might be advisable to insert a vacuum-filled joint at the top of the grade to replace the compound, which might otherwise drain out of the cable and leave the splice dry.

AIR POCKETS DANGEROUS

Wiping of Lead Sleeve.—Referring to the frequent statement that wiping of joints overheats the interior of cables to such an extent that some of the filling compound is driven out, leaving voids or air pockets, D. W. Roper, chairman of the meeting, asked for experiences in this connection. C. T. Sinclair, Pennsylvania Water & Power Company, responded by stating that he had found a temperature of 340 deg. F. existing within the lead sleeve of a cable at the end of one minute after wiping and 360 deg. at the end of six minutes, according to thermocouple measurements. In his opinion, this is hardly an injurious temperature unless the splicer takes a very long time to wipe the joint, in which case the outer layer of insulation may be injured. Mr. Rakestraw, Cleveland, pointed out that he knew of several places where joints had been remade several times and that no bad effects had been observed so far from this cause.

Filling the Joint.—Joints filled with paraffine have caused trouble in Detroit, said A. A. Meyer, observations indicating that the paraffine had cooled too rapidly after it was put in, thereby shrinking and not properly filling the joint. As a result the cable compound was drawn into the joint, leaving the cable dry and subject to failure.

Even a poor joint may stand up well in service if the sleeve is properly filled, declared Mr. Rakestraw. This requires keeping the compound sufficiently hot, pouring a large amount of compound through the sleeve to remove the entrained air and moisture, and adding compound at intervals after the initial cooling to make sure that the joint is absolutely full. The advantage of using a funnel in the lower opening of the sleeve and allowing the compound to run out an opening in the top was again emphasized.

The wrapping of joints with blankets and pads during cold weather at the time of filling in order to prevent rapid cooling of the compound was commended by several speakers.

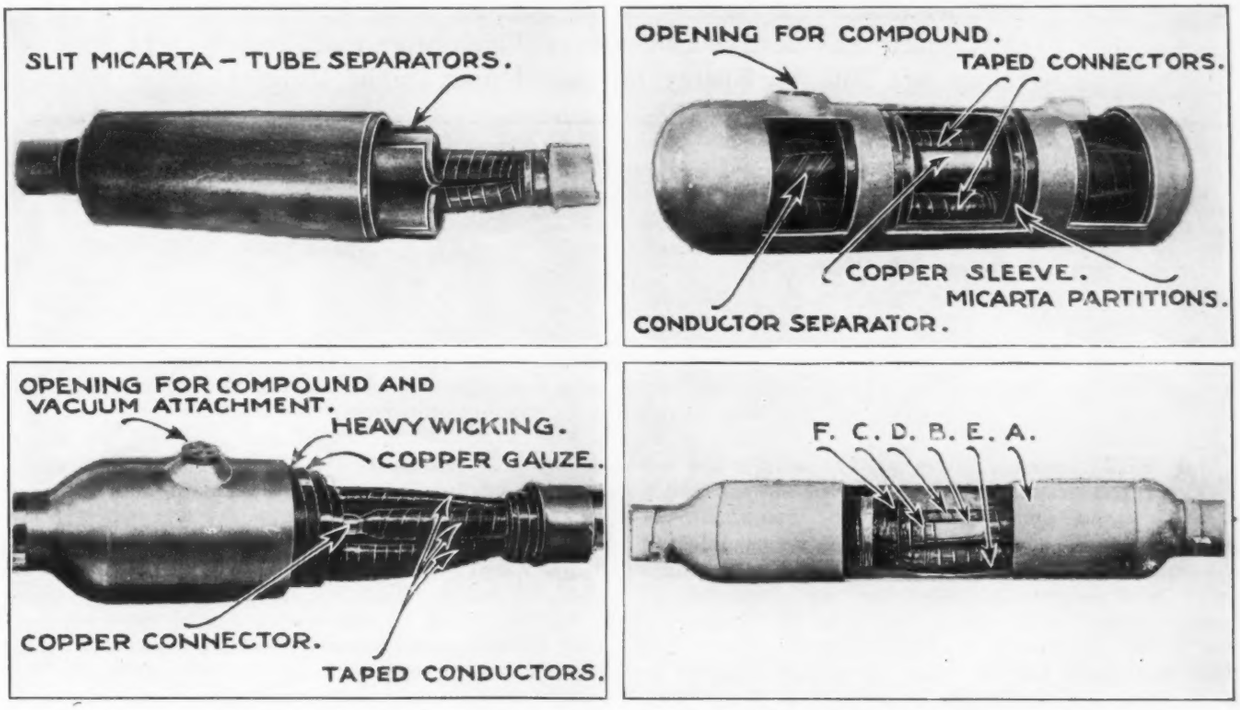
Mr. Hovey emphasized the need of making the joiner determine the temperature of the compound by means of a thermometer, instead of allowing him to depend on guesswork or on a temperature reading made by the helper. Considerable cooling may take place between the time the helper takes his reading and the time that the compound is poured into the joint. A thermometer partly covered with a brass casing is a convenient instrument to use.

The proper temperature at which to pour the compound depends upon the nature of the compound. The temperature must be determined by careful experiment.

Methods of Testing Experimental Joints.—Several types of cable joints have been made by the Commonwealth Edison Company and subjected to an accelerated life test, declared D. W. Roper, who said that voltages 60 to 70 per cent above normal were applied. In practically every case the failure occurred in the cable and not in the joint. The speaker attributed this to the dielectric loss because the distances in the joints were such that the loss was considerably smaller in the joint than in the cable. This would indicate that an accelerated life test is liable to be valueless if conducted at a considerable increase in voltage.

Commenting upon this experience, A. H. Kehoe, United Electric Light & Power Company, pointed out that some factor may have been stressed beyond the elastic limit, causing the unsatisfactory results obtained. He contended that the results would be more reliable if the tests were made at 20 per cent over voltage rather than with a higher voltage, although some satisfactory tests have been made at 300 per cent above normal voltage.

The major source of trouble in cable joints, declared



FOUR TYPES OF HIGH-TENSION CABLE JOINT THAT HAVE PROVED SATISFACTORY

Left top.—This construction is used for 12-kv. and 33-kv. cable joints by the Commonwealth Edison Company. Split tubes, made of the same material as the cable insulation, are used. The joints are gravity filled with semi-solid compound.

Right top.—Specially shaped micarta partitions that interlock to form a separate cell for each conductor constitute the feature of this joint, used by the United Electric Light & Power Company, Brooklyn Edison Company, Interborough Rapid Transit Company, Duquesne Light Company, and Puget Sound Power & Light Company. Tape is wrapped over the exposed conductor to act as a barrier to longitudinal current creepage. The ends of the lead sheath just inside the tape are belled to produce the desired voltage gradient.

Left bottom.—The cable joint is hand-wrapped with oil-saturated paper tape. In a similar manner an outer jacket is wrapped over the three conductors, properly spaced and packed with a saturated filler. This jacket is then pierced at several points so that the oil will enter its interior freely. Over the jacket copper gauze is applied, and around it a heavy lamp wick. After the joint is completed it is subjected, by means of a vacuum pump, to a vacuum of about 27 in. to 29 in. and then filled with a liquid compound. To supply any oil absorbed by the joint and the cable connected to it, a special pressure cup full of oil is applied and left connected for twenty-four hours, after which time the cup is removed and the hole capped and sealed. The New York Edison Company and the United Electric Light & Power Company have now in use over 1,600 joints of this type. The first 290 joints have been in operation at 24,000 volts since the summer of 1915.

It is believed that the oil in the vacuum-filled joint will permeate through the copper strands into the cable a long way from the joint, thereby maintaining saturation of the layers of paper in contact with the copper and thus helping to heal any displacement that the ends of the cable may be subjected to in reeling on the drum or handling during installation and racking in the manhole.

The vacuum process adds from $2 to $3 to the cost of the joint, but Philip Torchio, chief electrical engineer of the New York Edison Company, believes that it should be used for voltage higher than 13,200.

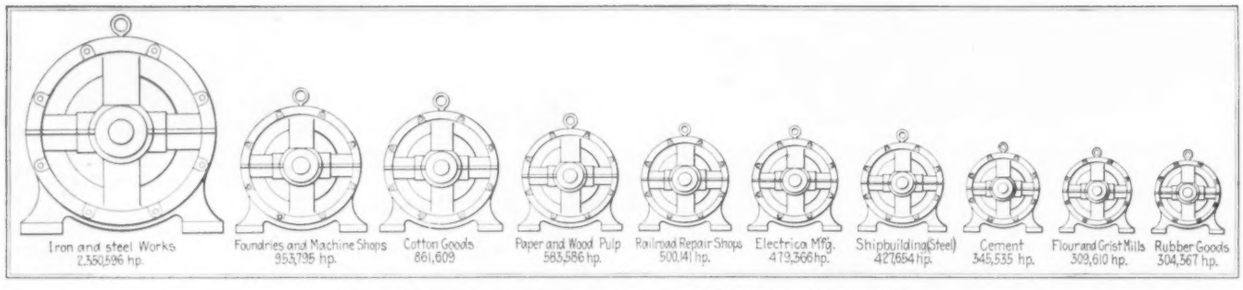
Right bottom.—This cable joint is used by the Public Service Electric Company on three-conductor paper-insulated 26,400-volt underground installations. After the cables have been trained to their proper positions in the manhole, 10 in. of the lead sheath is removed from the end of each cable and the belt insulation removed to within ⅜ in. of the lead. Next, 1½ in. of the insulation of each conductor is removed. A 24-in. lead sleeve (*A*) is then slid over one end of the cable and the ends of the cable sheath are slightly belled out so that there will be no acute edges for static discharges toward the conductors. Copper connectors (*B*) are slipped over the ends of the conductors, soldered and thoroughly cleaned. Starting 1 in. back from the end of the paper insulation (*C*), the insulation is removed half way down to the conductor forming a step in the insulation. After this has been done the exposed insulation is boiled out by pouring melted paraffine on it. Narrow strips of cotton tape (*D*) boiled in paraffine are used as a filler between ends of insulation and connectors. One layer of cotton tape is then wrapped around each connector, followed by successive layers of varnished cambric cloth, which are applied until the original insulation is level-full. Each conductor is now wrapped to a point (*E*) 3 in. from the outer insulation until the insulation over the connector is 40 per cent greater than the original insulation. A band of insulation is then wrapped around the individual insulated conductors equal to the original belt. Following this the lead sleeve is centered and sealed with a wiped joint, after which ¾-in. holes are cut in each end for filling with "Ozite" compound. After a thorough filling to exclude all air, the openings are carefully sealed and the entire length, including the joint, is covered with cheesecloth and cement for fire protection.

H. R. Woodrow, Stone & Webster, Inc., is the impossibility of preventing the formation of air pockets. There is a gradual deteriorating effect which causes air pockets that break down at high voltage. Hence what is needed in a life test is a cumulative test of the effects of such breakdowns. He spoke of making tests in which the material was not stressed beyond its elastic limit and in which 100 per cent voltage was applied, citing these as the best conditions which he had found for comparing different types of joints under the same conditions.

A test similar to that used in determining the effect of alternate heat and cold on porcelain insulators was suggested by W. D. A. Peaslee. In the test mentioned hot and cold air are alternately blown across the test object every fifteen or thirty minutes. This would be a valuable test, the speaker contended, if expansion and contraction of joints is accountable for their breakdowns, since it would hasten the results of such action. Since cable undergoes wider cycles of temperature variation than insulators, such a test might be well worth including in acceleration tests, he concluded.

Iron and Steel Works Lead in Total Installed Motor Rating

Number of Electric Motors in the Manufacturing Plants of the Country Is Placed at 1,483,039, of Which More than Two-thirds Are Run on Energy Purchased from Public Utilities


Iron and steel Works 2,550,596 hp.
Foundries and Machine Shops 953,795 hp.
Cotton Goods 861,609
Paper and Wood Pulp 583,586 hp.
Railroad Repair Shops 500,141 hp.
Electrical Mfg. 479,366 hp.
Shipbuilding(Steel) 427,654 hp.
Cement 345,535 hp.
Flour and Grist Mills 309,610 hp.
Rubber Goods 304,567 hp.

THE "BIG TEN" IN THE LINE-UP OF ELECTRIFIED INDUSTRIES

A VERY comprehensive picture of the marvelous growth in the use of the electric motor as a prime mover in the manufacturing plants of the United States is presented in the summary of the 1919 Census of Manufactures which was recently compiled for the committee of finance of the United States Senate by the Bureau of the Census. This summary indicates that at the end of 1919 there were 1,483,039 electric motors installed in the 237,855 establishments reporting on horsepower. In 1914 the number of installed motors was given as 772,362, showing that the number had almost doubled during the five-year period. The total rating of these motors is given as 16,317,383 hp. in 1919, against 8,847,622 hp. in 1914, once again almost double. The large part the central station has played is indicated by the fact that while the horsepower of the motors run by purchased energy increased from 3,917,655 hp. to 9,347,556 hp., or 5,429,901 hp., during the five-year period, the rating of the motors run by energy generated in the establishments reporting increased from 4,929,967 hp. to 6,969,827 hp., or only 2,039,860 hp. In 1914 the installed motor load of the isolated plants exceeded that of the central stations by over a million horsepower, while in 1919 the central-station connected motor load led by almost 50 per cent.

TABLE I—TOTAL NUMBER AND RATING OF ELECTRIC MOTORS INSTALLED IN THE MANUFACTURING PLANTS OF THE UNITED STATES IN 1919

Industry	Number of Establishments Reporting Horsepower	Aggregate Horsepower	ELECTRIC MOTORS: Total Number	Total Horsepower	Motors Run by Electrical Energy from Private Generating Plants: Number	Horsepower	Motors Run by Electrical Energy Purchased from Central Stations: Number	Horsepower
Total for all industries	237,855	29,575,242	1,483,039	16,317,383	487,039	6,969,827	996,000	9,347,556
Chemicals and allied products	4,744	1,431,083	55,655	891,909	25,482	422,200	30,173	469,722
Food and kindred products	50,645	2,671,546	156,671	1,364,231	40,217	419,238	116,479	945,020
Iron, steel and their products	17,870	8,128,545	296,707	5,096,469	126,513	2,586,707	170,248	2,509,835
Leather and its finished products	4,655	388,588	34,118	260,903	11,322	118,296	22,796	142,607
Liquor and beverages	1,107	376,774	16,819	148,038	10,786	84,364	6,033	63,674
Lumber and its manufactures	36,377	3,445,765	64,592	757,100	21,384	313,789	43,212	443,305
Metal and metal products	4,129	941,652	42,235	631,462	13,203	218,938	28,880	412,524
Miscellaneous industries	50,073	4,217,776	325,739	2,865,387	102,547	1,034,589	223,237	1,830,681
Paper and printing	29,114	2,397,175	179,771	1,037,467	27,666	420,147	152,105	617,320
Railroad repair shops	1,970	648,345	33,896	550,157	18,739	295,161	15,157	254,996
Stone, clay and glass	9,887	1,549,909	38,367	860,395	13,905	304,595	24,462	555,810
Textiles	23,618	2,983,520	201,265	1,514,169	61,078	633,166	140,211	881,003
Tobacco manufactures	1,347	45,398	5,528	29,501	1,958	13,819	3,570	15,682
Vehicles for land transportation	2,319	349,166	31,676	310,195	12,239	104,818	19,437	205,377

Table I gives a summary of the prime-mover data gathered in the 1919 Census of Manufactures tabulated under fourteen groups of industries. The aggregate primary power in the manufacturing plants of the country at the end of 1919 was 29,575,242 hp., which includes the machinery necessary for the operation of the private electric generating plants. If the estimated horsepower of the prime movers in private generating plants is subtracted from the aggregate horsepower, a total of 25,386,000 hp. is left as the primary power actually used for manufacturing purposes, of which 16,317,383 hp., or 64.4 per cent, is electrical.

The industries included under "iron and steel and their finished products" lead the country in total installed rating. The electrification of this industry is all the more marked when the fact is considered that the large amount of electrical energy used for industrial heating in the iron and steel mills involves only such motor installation as is necessary in the operation of the heating apparatus. Motors totaling 2,586,707 hp., or 50.8 per cent of the total electric motor installation in the iron and steel industry, are run by energy manufactured in private generating plants. This is the only industrial group in which a major portion of the installed motor rating is run by privately generated energy. It should be noted, however, that almost fifty thousand more motors in the iron and steel industry are run by central-station energy than by energy generated in private plants. The average size of the motors installed in iron and steel plants is 17.8 hp., against an average of 11 hp. for the whole country.

As indicated in Table II, in 1919 there were fifty-six American unit industries having a total electric motor installation of more than 50,000 hp., of which only one reported motor installation in excess of 1,000,000 hp. In seventeen of these industries the horsepower of the motors run by energy generated in private plants exceeds the horsepower of the motors run by purchased energy. "Steel works and rolling mills" easily lead all industries, with 2,350,596 motor horsepower, this industry being 71.5 per cent electrified. "Foundry and machine-shop products," however, lead in number of installed motors, reporting 88,258, followed by "electrical machinery apparatus and supplies" with 80,495 motors.

TABLE II—AMERICAN INDUSTRIES HAVING AN ELECTRIC MOTOR INSTALLATION OF OVER 50,000 HP. IN 1919

Rank in Horsepower of Installed Electric Motors	Industry	Number of Establishments Reporting Horsepower	Aggregate Primary Horsepower	ELECTRIC MOTORS					
				Total		Run by Energy Purchased from Public Utilities		Run by Energy Generated in Establishment	
				Number	Horsepower	Number	Horsepower	Number	Horsepower
1	Iron and steel, steel works and rolling mills	499	3,820,917	85,480	2,350,596	22,053	695,097	63,427	1,655,499
2	Foundry and machine shop products	10,597	1,054,840	88,258	953,795	63,061	660,037	25,197	293,758
3	Cotton goods	1,278	1,840,201	61,455	861,609	38,152	515,309	23,303	346,300
4	Paper and wood pulp	722	1,861,089	17,756	583,586	6,001	236,662	11,755	346,924
5	Cars and railroad shop construction	1,470	594,515	30,185	500,141	11,636	207,630	18,549	292,511
6	Electrical machinery, apparatus and supplies	1,345	438,839	80,495	479,366	42,023	235,605	38,472	243,761
7	Shipbuilding, steel	157	475,567	20,616	427,654	18,296	377,862	2,320	49,792
8	Cement	117	488,808	8,500	345,535	4,138	182,486	4,362	163,049
9	Flour-mill and grist-mill products	10,673	876,405	11,493	309,610	9,667	263,497	1,826	46,113
10	Rubber goods	404	354,188	13,616	304,367	7,083	153,214	6,533	151,153
11	Lumber and timber products	25,185	2,418,937	12,401	279,478	4,013	83,872	8,388	195,606
12	Automobiles	308	287,323	25,702	270,356	14,283	176,930	11,419	93,426
13	Iron and steel, blast furnaces	193	1,581,432	7,450	242,554	1,004	48,204	6,446	194,350
14	Chemicals	486	376,940	17,452	235,973	10,492	126,419	6,960	109,554
15	Automobiles parts and bodies	2,271	256,919	23,421	220,214	21,773	202,458	1,648	17,756
16	Engines, steam, gas and water	364	190,021	17,496	213,727	10,008	103,315	7,488	110,412
17	Slaughtering and meat packing	1,004	359,212	16,491	213,548	8,954	117,913	7,537	95,635
18	Coke, not including gas-house coke	155	224,879	5,919	209,163	1,950	74,551	3,969	134,612
19	Lumber, planning-mill products	5,232	419,671	20,466	199,694	16,944	162,195	3,522	37,499
20	Brass, bronze and copper products	1,011	265,688	11,227	183,594	8,759	142,996	2,468	40,598
21	Printing and publishing, newspapers and periodicals	12,735	194,361	53,614	172,786	48,987	154,947	4,627	17,839
22	Cars, steam railroad, not including operation	92	157,865	10,157	170,485	3,462	62,827	6,695	107,658
23	Worsted, goods	283	295,533	12,299	166,919	4,024	37,869	8,275	129,050
24	Structural ironwork, not made in steel works	1,073	165,347	14,218	166,460	9,600	114,411	4,618	52,049
25	Ice	2,778	572,970	8,169	158,552	5,658	132,438	2,511	26,114
26	Bread and other bakery products	17,151	165,950	41,311	146,388	37,602	125,665	3,709	20,723
27	Leather, tanned, cured and finished	656	218,238	10,601	143,935	4,329	58,494	6,272	85,441
28	Glass	359	207,430	9,720	143,125	3,397	52,864	6,323	90,261
29	Confectionery and ice cream	5,487	179,991	23,429	138,344	19,787	115,069	3,642	23,275
30	Furniture	2,756	262,703	19,546	136,721	12,962	86,527	6,584	50,194
31	Brick and tile, terra-cotta	2,216	405,746	4,838	133,354	3,408	105,846	1,430	27,505
32	Locomotives	17	97,187	5,763	118,873	2,927	59,084	2,836	59,788
33	Food preparations, not elsewhere shown	1,675	150,230	10,908	112,798	8,798	91,643	2,110	21,159
34	Liquors, malt, including cereal beverages	718	324,431	14,539	110,755	4,678	41,844	9,861	68,911
35	Petroleum, refining	257	238,906	6,665	108,625	3,576	51,385	3,089	57,240
36	Silk goods	1,332	176,825	35,310	107,982	22,579	75,234	12,731	32,748
37	Marble and stone work	3,338	170,132	6,728	106,033	6,065	94,028	663	12,005
38	Agricultural, implements	497	128,249	7,993	100,263	4,594	47,842	3,399	52,421
39	Machine tools	697	100,433	11,408	98,817	7,751	70,037	3,657	28,780
40	Oil and cake, cottonseed	708	290,911	2,402	93,400	1,964	82,256	438	11,144
41	Fertilizers	564	125,939	4,535	93,111	3,758	79,886	777	13,225
42	Knit goods	1,962	151,601	15,509	91,137	10,928	59,680	4,581	31,457
43	Iron and steel, forgings	239	101,951	6,078	90,693	4,948	73,738	1,130	16,955
44	Paving materials	852	191,543	1,868	86,730	1,708	81,179	160	5,551
45	Wire	66	119,451	3,329	86,646	2,148	55,030	1,181	31,616
46	Boots and shoes	1,391	120,632	16,279	83,792	11,698	55,690	4,581	28,102
47	Automobile repairing	14,825	82,691	19,684	63,575	19,537	63,057	147	518
48	Minerals and earths, ground	403	127,074	1,669	61,457	1,473	55,529	196	5,928
49	Steam fittings and hot-water apparatus	247	67,504	4,953	58,232	4,154	45,187	799	13,045
50	Paints	551	73,702	3,552	55,853	2,270	36,685	1,282	19,168
51	Gas manufacture	767	238,467	3,235	55,403	1,413	33,363	1,822	22,040
52	Sugar refining, not including beet sugar	19	52,541	3,923	54,668	3	360	3,920	54,308
53	Coal-tar products	169	68,342	5,507	53,693	2,162	27,376	3,345	26,317
54	Smelting and refining, zinc	39	73,604	2,171	52,996	639	13,508	1,532	39,488
55	Boxes, wooden packing, except cigar	1,051	144,048	4,930	51,680	3,727	39,165	1,203	12,515
56	Tools	1,072	68,381	5,164	50,494	4,584	42,220	580	8,274

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

Conductivity of Copper-Clad Steel

To the Editors of the Electrical World:

In the article entitled "Copper-Clad Steel Wire Advocated for Distribution Circuits," published in the July 22 issue of the *Electrical World*, a correction should be made. The conductivity of the "mechanical grade" is approximately 30 per cent that of copper, instead of 30 per cent less than that of copper as asserted on the first page of the article.

B. C. DENNISON.

Carnegie Institute of Technology,
Pittsburgh, Pa.

Jobber's Willingness to Cut His Profit

To the Editors of the Electrical World:

I have read with a great deal of interest your article entitled "To Untangle Our Distribution Snarl" in the July 8 issue of the *Electrical World*. Having made a study of the psychology involved between the eternal quadrangle of manufacturer, jobber, dealer and consumer, I was sorry to note that you did not bring out in your article one of the chief causes of friction between the manufacturer and the jobber—one that must, sooner or later, be eliminated. That is, the tendency on the part of the jobber to cut his profit.

Much of the complaint on the jobber's part as to the lack of profit on some lines is due essentially to his own shortsightedness, as the natural conclusion for a manufacturer to reach when he finds the jobber is cutting prices is that the jobber is satisfied with a smaller margin of profit. The manufacturer accordingly takes advantage of this deduction and reduces the jobber's margin when the next period for a price revision arrives. This tendency on the part of jobbers is responsible for a great deal of their financial loss and unrest in handling staple lines where margins have been brought down to so low a point that I fail to understand how they handle them at all.

Working on the theory of giving to the jobber a profit that will earn him a return on his investment equal to that which the manufacturer expects, we have started out in the marketing of a new product by giving the jobber a long margin of gross profit. We have done this believing that the experiment is worth what it will cost us and in an effort to establish definitely whether the jobber really appreciates a margin of this kind or whether he will take advantage of the fact and lower prices in an endeavor to increase his sales or deplete his stocks.

We have found that a sliding scale of discounts, based on the loading system, is one of the greatest evils attributable to the manufacturers' price schedules, as there is no better way to encourage price cutting than to work on such a basis. This scaling of discounts in proportion to quantities makes it very difficult for the small dealer to maintain a competitive position against the larger dealer, for the reason that in most cases the larger dealer will cut the retail price on standard items to a point where the small buyer is unable to compete and make a profit. The old trick of the large dealer in offering the salesman an order if he will sell at the best price is one that generally works as few salesmen are able to turn down a sizable order at a price at which they know their house can make a profit. This generally results in the salesman being able to convince his house that this customer is a valuable one and should be accorded the best price to hold his business.

We can see very little reason for a sliding scale of discounts to the dealer, as the manufacturer relies on the jobber for quantity business, and when he has established a good profit for the jobber, specifying a fair initial order so as to insure a representative stock and to compensate for the discount which the manufacturer gives, from then on the distribution problem should be made as easy as possible. Where a sufficient profit is provided the jobber should be able to make sales with little friction or effort.

We hope that when you are next tackling this particular problem you will go into these phases of the matter. I think you will arrive at the same conclusions we have reached and find that the industry will respond to a more or less standard system of distribution based on simplicity.

Our definition of a concern entitled to our jobbing price is one which carries a representative stock of supplies valued at not less than $25,000, issues a catalog and employs two or more traveling salesmen.

We waive the catalog requirement where the stock carried is considerably in excess of our minimum requirements. We note that your definition of a jobber virtually coincides with this, and we are glad to know that this is so.

S. D. LEVINGS,
Treasurer.

Betts Electric & Manufacturing Corporation,
New York City.

Need for More Information on Circuit-Breaker Tests

To the Editors of the Electrical World:

I have read with interest the editorial in the *Electrical World* for July 8 on the Baltimore circuit-breaker test records. As I sent a man all the way to Niagara Falls to be present at the convention and discuss these tests, I fully agree with your criticism. The manufacturers did not give any real details as to what actually happened and wherein breakers which failed were to be strengthened in the future. This was disappointing, because we have during the past six months spent large sums of money and given the use of our system to the manufacturers for the making of very complete tests on 22,000, 44,000 and 110,000-volt circuit breakers. Tests were made on our system such as have never been made before on any system, and short circuits as high as 750,000 kva. were opened. These tests, made under actual operating conditions, gave us most valuable information, and we believe the manufacturers also profited greatly from them.

If the manufacturers do not desire to publish in detail the results of their tests, it seems to me there is no place where the apparatus committee of the National Electric Light Association could function to better advantage than in conducting a complete set of oil-switch tests for the benefit of the member companies. I am sure there are now several operating companies which would willingly loan the use of their system for such tests.

W. E. MITCHELL,
Assistant General Manager.

Alabama Power Company,
Birmingham, Ala.

Industrial and Station Practice

Installation, Operation, Test and Repair of
Generating and Distribution Equipment and Methods of Economically Utilizing
Electrical Energy in Mills and Factories

Selection of Mill-Type Motors

Proper Speed Characteristics and Ability to Carry Maximum Load Without Undue Mechanical Strain Main Problem—Inclosed Motors Usually Required

MOTORS to operate steel-mill auxiliaries, cranes, hoists, lift bridges, drawbridges, machinery for handling ore and coal and other similar apparatus are usually built with cast-steel frames, large shafts, heavy bearings and long sturdy armatures of small diameter. The armature diameters are kept small in order to reduce the flywheel effect and the amount of energy required to accelerate them. The fields have interpole windings to enable the motors to commutate heavy overloads without injurious sparking. On account of their sturdy construction mill-type motors are able to carry loads of short duration running as high as three times their one-hour rating or four and one-half times the continuous or five-hour inclosed rating. While both totally inclosed and open frame mill motors are built, most mill applications require totally inclosed motors. Hence the following discussion has been directed particularly to this type.

Totally inclosed mill motors are rated in two ways—by the mill rating or by the crane rating. Both are based on a temperature rise of 75 deg. C., which is not harmful on account of the heat-resisting qualities of the insulation. The mill rating is the one-hour capacity of the motor with 75 deg. C. temperature rise, and the crane rating is the half-hour capacity with the same temperature rise. The one-hour rating is the one most commonly used.

Mill-type motors are seldom used for applications where the load is continuous unless the atmospheric conditions are such that a totally inclosed motor is required. There are many applications where the motor is used only occasionally and where the load requirements are such that there are definite periods of acceleration, running at balancing speed and retardation. In many such cases the motor is in use such a small part of the time that the heating of the motor is a minor consideration. Selecting a motor for an application of this kind is largely a matter of choosing one which has the proper speed characteristics and which can carry the maximum load without being subjected to undue mechanical strain. There are other applications where the cycle of operation is fairly well defined and where the cycle is repeated often enough to cause considerable heating of the motor windings. In such cases it is necessary to calculate the heating effect of the load cycle and select a motor with a continuous rating high enough to go through the cycle for long periods without overheating.

There is still another type of application in which a new element enters, that is, the element of time. Examples of this type of application are screwdowns, lift tables, side guards, manipulator fingers and roll tables. In these cases there is no definite cycle of operation. For example, the motor on a blooming mill

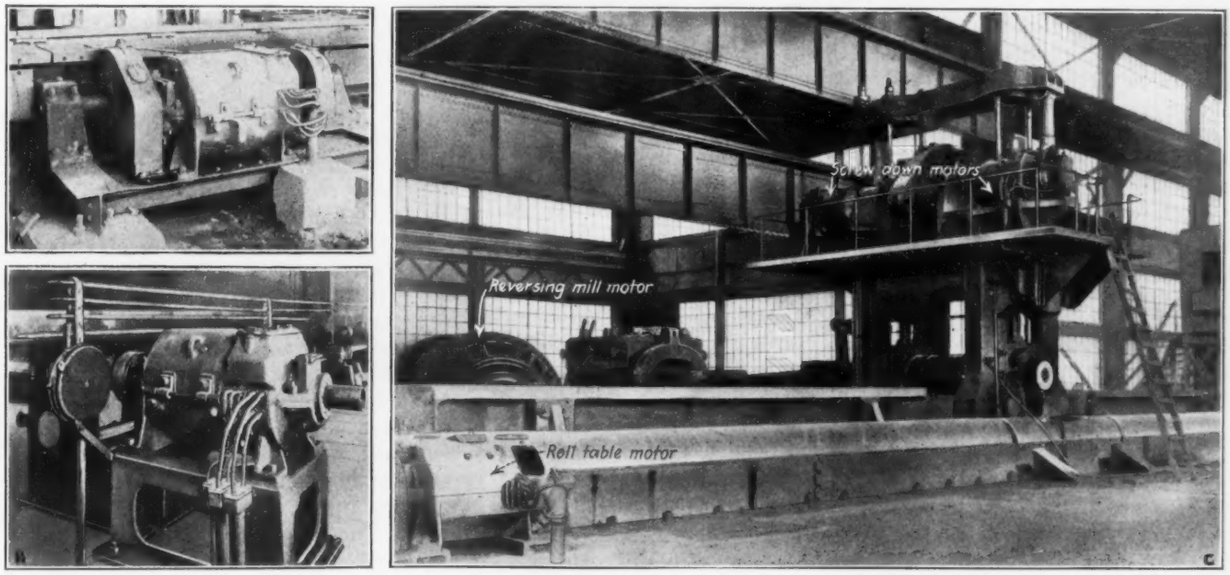


FIG. 1—MILL-TYPE MOTORS MUST BE OF STURDY CONSTRUCTION TO CARRY HEAVY OVERLOADS

A—Mill-type motor driving blooming-mill roll table. B—Same type of motor installed for operating furnace doors. C—Electrically driven blooming mill. Roll-table motor may be seen in the lower left-hand corner. The screwdown motors are on the mill platform. Reversing motor for driving rolls in the left background.

screwdown is required to move the top roll of the mill a certain distance after each pass. The distance which the roll is lowered varies for every pass, and the number of times the motor is started and stopped for each motion depends upon the skill of the operator. When a bloom is finished the top roll is raised 15 in. or 20 in. or more so that the next ingot can be entered in the rolls. This is practically the only time when the motor has time to reach friction load speed. It is quite possible to have two motors on a drive of this type which give the same friction load speed and have one motor give unsatisfactory operation. This is illustrated by Fig. 2A. This

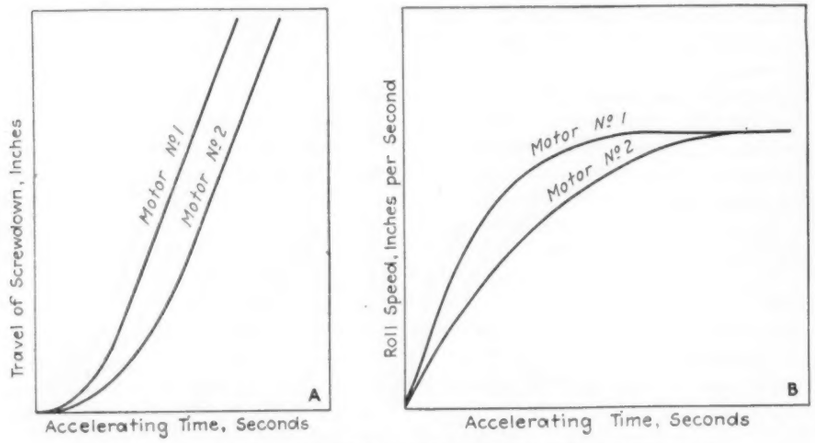


FIG. 2—CHOICE OF EACH MILL MOTOR DEPENDS UPON PARTICULAR CHARACTERISTICS REQUIRED

A—Time-distance curves of a screwdown, showing motion of top roll of a blooming mill. B—Speed-time curves of two motors, showing speed of motion of top roll of blooming mill.

figure shows the travel of the roll plotted against time for two screwdown drives, which are geared for the same free running speed, as shown by the fact that the curves are parallel at the upper ends. The curve of motor No. 2 shows a case where the motor does not have sufficient torque to accelerate itself and the load as rapidly as is desired. Since all the movements except the return travel when the bloom is finished are short, it is evident that the curve of motor No. 1 shows the better operation.

The speed-time characteristics of the two drives are shown in Fig. 2B. This brings out the fact that the speed-time characteristic of a motor for a given application is very important in instances where the time for each operation is short. The rate of acceleration depends upon the torque of the motor and the inertia of the motor, pinion, brake and load. In many cases the inertia of the motor, pinion and brake make up the greater portion of the total inertia. For such drives as lift tables the time available for each up or down motion is usually between two and three seconds. The load torque is high, which means that the starting current must be heavy if the motor is to accelerate rapidly. For such an application it is often better practice to force a small motor to the limit of its capacity than to go to a larger size. The next larger size motor may require a larger brake with larger inertia, and the inertia of the armature will also be considerably increased. Unless the torque of the larger motor will compensate for the increased inertia and leave a good margin of torque for faster acceleration, it will not pay to use a larger motor. The heating of the motor is greatly increased by forcing it to the limit of its ability to commutate. By providing a small motor-driven blower to give forced ventilation the continuous capacity of the motor can usually be increased by about 50 per cent, so that the temperature can be kept within safe limits.

It is obvious that in selecting the proper motors for mill auxiliary drives there is no single method of procedure which will fit all cases. The calculations range from the most elementary to complicated calculations involving inertia of rotating parts, friction load torque, selection of proper gear ratio, ohmic value of starting resistor steps, interval between closing of accelerating contactors, frequency of operation and heating of the motor after repeated operation. For all but the more simple drives it is usually necessary to employ a cut-and-try process, going far enough with each caculation to show the limitations of the motor for the application or that it is satisfactory.

On account of the wide variation in the friction of mill machinery and variations in the over-all efficiency due to wearing of the working parts, it is always advisable to have some margin of capacity. Whenever possible the drive being studied should be compared with similar drives which are in operation. Oscillograms and high-speed graphic meter charts are of great assistance in studying existing drives.

R. H. WRIGHT,
General Engineer,
Westinghouse Electric & Manufacturing Company,
East Pittsburgh, Pa.

Underfeed Stoker Most Favorable for Burning Lignite

OF THE devices for burning lignite, the underfeed stoker proved to be the best adapted and showed the most favorable results in experiments made by the Texas Power & Light Company. This type of stoker demonstrated its ability to burn crushed run-of-mine lignite with good economy and to develop high overloads. Excellent flexibility in operation was shown as well as low fuel consumption for banking periods. Allowing for the lower efficiencies obtained in daily operation as compared with that obtained on tests, one barrel of fuel oil having a heating value of approximately 19,000 B.t.u. per lb. is equivalent to about 0 5 ton of lignite of 7,000 B.t.u. per lb. This ratio, however, does not take into account the cost of coal and ash handling or extra boiler-room labor required with solid fuel.

One of the most difficult problems in burning lignite is to obtain successful ignition of the incoming fuel. The large moisture content of the fuel must be quickly evaporated on entering the furnace, and to do this the furnace design should be such as to develop a high furnace temperature and to concentrate the radiant heat both from the walls and from the luminous flame upon the incoming fuel.

The tests conducted on the underfeed stoker included evaporation, quick steaming and banking. Five evaporative tests are given in the accompanying table. The test shown in the second column was conducted

EXTRACTS FROM RESULTS OF TESTS BURNING TEXAS LIGNITE ON AN UNDERFEED STOKER

Dimensions: Kind of stoker, underfeed; width of grate surface, seven-retort; length of grate surface, twenty two tuyéres; water-heating surface, 5,184 sq.ft.; superheating surface, 883 sq.ft.; volume combustion space, 6,067 cu.ft.; minimum distance grate to heating surface, 7 ft. 3 in.

Character of fuel	Lignite	Lignite	Lignite	Lignite	Lignite
Point of origin of fuel	Tredlow	Hoyt	Hoyt	Hoyt	Hoyt
Average pressures, temperatures, etc.:					
Steam pressure by gage, lb. per square inch	207.8	212.3	206.5	204.8	206.1
Temperature of steam, deg. Fahr.	535.1	556.4	512.0	509.1	540.7
Superheat, deg. Fahr.	145.1	163.4	121.6	119.4	150.5
Temperature of feed water, deg. Fahr.	85.9	84.4	77.0	70.5	65.4
Temperature of escaping gases, deg. Fahr.	586.9	670.5	496.3	492.3	564.1
Percentage of rated capacity developed	193.7	247.5	99.68	97.0	151.1
Economy and efficiency:					
Water fed per pound of fuel as fired, lb.	3.40	3.29	3.94	3.62	3.35
Calorific value per pound, fuel as fired, B.t.u.	6,845	7,206	7,058	7,026	6,925
Efficiency of boiler, furnace and grate, per cent	61.05	56.61	68.44	63.47	60.51
Proximate coal (as fired):					
Moisture, per cent	35.95	34.30	34.76	36.13	33.38
Volatile matter, per cent	31.05	30.61	28.34	27.72	27.35
Fixed carbon, per cent	22.92	26.20	27.81	26.72	25.86
Ash, per cent	10.08	8.89	9.09	9.43	13.41
Sulphur, per cent	.....	.....	0.48	0.41	0.86

to determine the highest rating that could be obtained, and this proved to be 247.5 per cent of the rated capacity for the particular boiler used. Prior to each test the stoker was operated for a period of about fifteen hours at the rating at which the test was to be made, using the test fuel to insure that the setting would be thoroughly heated.

In burning lignite the best results were obtained with thin fuel beds, usually from 8 in. to 10 in. deep over the tuyères. With the thin fuel beds correspondingly low air pressures were carried in the tuyère boxes, the pressure ranging from 0.9 in. to 1.9 in. of water according to the rate of combustion. The principal operating difficulty while burning this fuel was the tendency, particularly at high ratings, to form large clinkers of a saddle shape on the lower tuyères, bridging across adjacent rows of tuyères. If these clinkers were not removed, the fuel bed at these parts would become heavy and the green fuel would drift over the clinkers.

Results of the banking and quick-steaming tests are of particular interest. The quick-steaming test was made after a dead-bank of forty-five hours, from which condition the boiler was brought on the line and the safety valve lifted in thirty-four minutes after starting the fan and stoker engine. Five minutes later the flow meter showed the boiler to be developing 200 per cent rating.

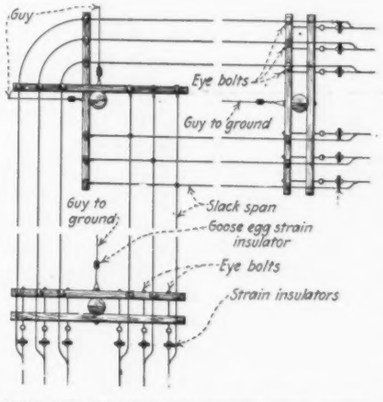
A live banking test covering a period of seventy-three hours showed that pressure could be maintained on the boiler between the limits of 175 lb. and 200 lb. by the consumption of 0.4 lb. of lignite per boiler horsepower per hour. This figure compares very favorably with results obtained with bituminous coals. Upon the conclusion of this test the fan and stoker engine was started, and in five minutes the boiler was on the line and developing over 200 per cent rating.

This information is taken from the report of E. T. Keck of the Texas Power & Light Company, which was prepared for the prime movers' committee of the N. E. L. A. and was included in the annual report of this committee presented at this year's convention at Atlantic City.

FIELD EDITOR ELECTRICAL WORLD.
New York, N. Y.

Better Line Corners

DIAGONAL guying on corner poles and elimination of double arms are objectionable when the strain is above normal. It is practically impossible to place a head guy splitting the angle and have the pole stand up straight, owing to the unequal tension when stringing the line. It is also difficult with this method of guying to sag the conductors evenly. Better construction results by placing two line head guys as shown. On the adjacent poles strain insulators should be used as indicated, omitting the pin-type insulators on the first arm. When the loading is heavy it is more practical to double-arm the corner pole rather than use a special cross-arm of heavier cross-section as this would be an undesirable departure from standard.

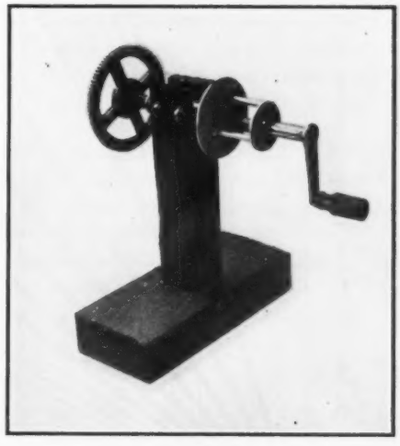


STANDARD CORNER CONSTRUCTION GIVES BEST RESULTS

P. P. ASHWORTH,
Distribution Engineer.
Utah Power & Light Company,
Salt Lake City, Utah.

Graphic Meter Chart Winder Easily Constructed

AFTER editing any length of tape taken from a graphic meter, it is a tedious process to rewind by hand and was overcome in one case by the winder shown in the accompanying illustration. This consists of a wooden standard slotted at the top to receive a sleeve, made from a wire connector, which is fastened by screws. In the winder shown a magneto crank with removable handle was placed in the sleeve upon which the graphic chart spool holder is held by the threaded crank handle



SIMPLE WINDER THAT HELPS IN EDITING GRAPHIC CHARTS

pushing it against a collar on the shaft. This collar bears against the end of the connector.

To take up the extra length of shaft from the end of the sleeve to the gear wire was wound on like a closely wound spring. Washers were then placed on the shaft at both ends of the sleeve in order that the shaft and spool might turn freely.

To wind the tape an empty spool is slipped onto the holder, the end of the tape fastened to it in the regular way and the tape guided by hand against the larger disk. If the base is heavy or solidly fastened the tape can be wound on rapidly and evenly without tearing. The paper is also much cleaner than when wound by hand.

FIELD EDITOR ELECTRICAL WORLD.
Boston, Mass.

Easily Made Charts Assist in Line Calculations

TO ASSIST in making line-constant calculations for a three-phase, 2,200-volt distribution system, the writer drew the following charts with an assumed constant power factor. No account was taken of the reactive voltage drop since in a number of instances it may be neglected. In such cases these charts offer a rapid and easy means of line calculation when the size of the copper required to transmit a given amount of power with a given percentage power loss is desired.

These charts are easily constructed and require little time for calculation since the graph consists of straight lines pasing through zero so that a series of charts for different power factors can readily be laid out. Chart A gives the cross-sectional area of copper required as a function of the kilowatt-feet and the percentage power loss obtained from the formula:

$$\text{C.M.} = WL\rho/E^2 n \cos^2\theta, \quad (1)$$

where

C.M. = cross-sectional area of wire (circular mils),
W = watts to be transmitted,
L = distance of transmission in feet,
ρ = specific resistance of copper (10.37 ohms per mil-foot at 20 deg. C., solid conductor, and 10.57 ohms per mil-foot at 20 deg. C., stranded conductor),
E = receiver line voltage (2,200),
n = percentage power loss, also percentage resistance voltage drop, and
$\cos\theta$ = receiver power factor (85 per cent).

Equation (1) is obtained as follows:

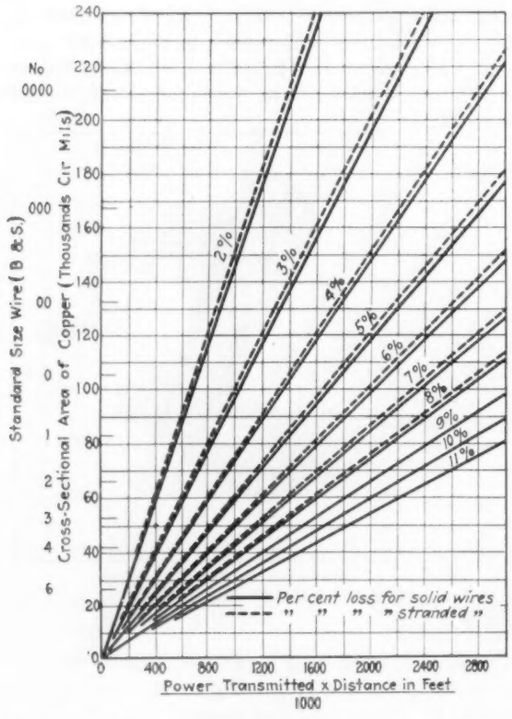
$$I = W/\sqrt{3}\,E\cos\theta \quad (2)$$

where I = current per wire of the three-phase circuit.

Now, to allow a power loss of n per cent, the loss per wire is $nW/3$ watts; therefore

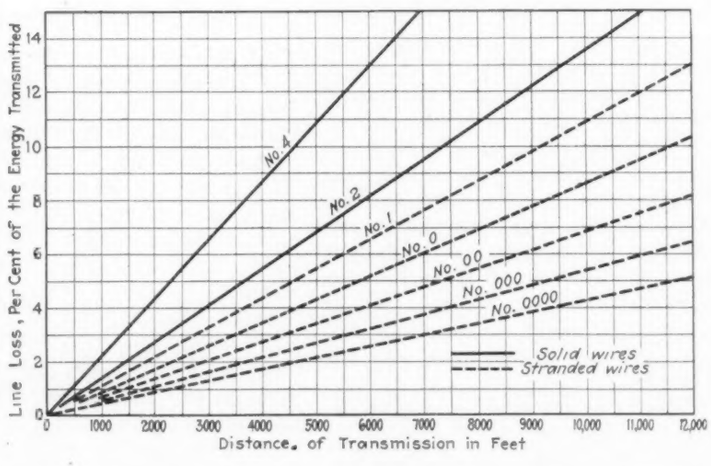
$$I^2R = nW/3, \quad (3)$$

and so $R = Wn/3\,I^2$, where R = resistance per wire.



LINE DROP CHARTS

A—Size of copper necessary to transmit power at a given line loss. B—Line loss calculated on a basis of 300 kw.



However $R = L\rho/\text{C.M.}$, and, substituting in (3):

$$\text{C.M.} = L\rho\,3\,I^2/Wn. \quad (4)$$

But

$$I^2 = W^2/3\,E^2\cos^2\theta, \quad (5)$$

and, substituting (5) in (4):

$$\text{C.M.} = (3\,L\rho/Wn)\,(W^2/3\,E^2\cos^2\theta) = WL\rho/E^2 n\cos^2\theta. \quad (6)$$

Substituting the known values in (6):

$$\text{C.M.} = WL\,10.37/n\,(2{,}200)^2(0.85)^2 = WL\,2.96(10^{-6})/n.$$

Changing WL to kw.L, multiplying by 1,000, we get:

$$\text{C.M.} = \text{kw.}L\,2.96(10^{-3})/n = 2.96\ \text{kw.}L/1{,}000\ n.$$

Since there is no constant term and no second degree term, this equation is a straight line passing through zero. So, choosing an abscissa of 1,000 (kw.-ft. $\times$ 10^{-3}) as a factor K, we plot points on that vertical line for different values of power losses. For example, to locate the 10 per cent power loss line:

$$\text{C.M.} = K\,2.96/0.10$$

$$\text{C.M.} = (1{,}000)\,(29.6) = 29{,}600,$$

and we plot the point 29,600 on the 1,000-kw.-ft. line and, drawing a line through zero, obtain the line representing a power loss of 10 per cent. Continuing to plot points for new values of losses, we get the corresponding ordinates of circular mils and secure the positions of these lines.

To illustrate the use of this chart, assume that it is desired to find the size of copper required to transmit 500 kw. 3,000 ft. with a power loss of 5 per cent. The kw.-ft. $\times$ 10^{-3} = 500 $\times$ 3 = 1,500. Locating this abscissa and following it to its intersection with the 5 per cent loss line, we read across to the ordinate to find that the size of copper required is approximately 90,000 circ.mil. The nearest standard size is No. 1 B. & S. gage, which has a cross-sectional area of 83,690 circ.mil. This size will increase the power loss slightly.

Chart B has been constructed in a similar way, but for 300 kw. only, using the transmission distance as abscissa and the line loss as ordinate. If 500 kw. is to be transmitted 3,000 ft., it will be necessary to reduce it to a 300-kw. basis; e.g., 500 $\times$ 3,000 $\div$ 300 = 5,000 ft.

The percentage power loss is the same. Locating the abscissa of 5,000 ft. and following it up to the intersection with 5 per cent, we find our wire size somewhere between No. 0 and No. 1, B. & S. If No. 1 is chosen, we get a power loss of 5.4 per cent.

IRWIN J. CAMPBELL.
Johnstown, Pa.

Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

Texas Company Adopts Standardized Electrical Store

Interesting Development in a Central Station's Policy to Build Up Its Merchandising Business

THE opening of this new electric store and office in Sherman, Tex., marks another step in the broad commercial policy of the Texas Power & Light Company to push aggressively the sale of electrical goods in all the cities and towns where it supplies energy. This store represents the type which the company has adopted as standard for its entire property.

J. C. Carpenter of Dallas, vice-president and general manager of the Texas Power & Light Company, who is largely responsible for this movement, plans to employ these modern and attractive stores, with efficient and courteous clerks to sell merchandise, in a campaign to make Texas the leading state in the use of electricity and electrical devices in the home. The sale of electrical appliances will now be made of chief importance in the company's activities.

As will be seen from the accompanying cuts the proper display of appliances and electrical material received first consideration in the designing of the store. That it is also an office is scarcely apparent. Another feature of the new store that has attracted favorable public comment is the manager's office in the rear, which is entirely open. The manager is thus at all times accessible to visitors to the store, and is not hidden in a private office where it seems necessary to run the gantlet of an office boy and a stenographer to get to see him.

Electrical men who visited the new store on opening day were unanimous in the opinion that its attractive and convenient arrangement is particularly adapted to meet the merchandising requirements of the central station company.

The Sherman store is the first of a series of electrical stores of standard design which will be opened by the company wherever it maintains an office. The company believes that it can build up its appliance business only by rendering a complete merchandising service to its customers, and accordingly plans are now being made to establish stores in the following Texas cities and towns reached by its lines: Bonham, Brownwood, Cleburne, Commerce, Denison, Ennis, Gainesville, Hillsboro, McKinney, Palestine, Paris, Taylor, Temple, Tyler, Waco and Waxahachie.

VIEWS OF TEXAS POWER & LIGHT COMPANY'S NEW ELECTRICAL STORE
Top—Display window. Bottom, left—Interior looking toward front of store. Bottom, right—Interior looking toward rear and manager's office.

The Meter Reader as a Good Will Builder

THE public's attitude toward a central station is influenced to a great degree by personal contact with the company's employees, and the meter reader probably has more opportunities to make friends for the company than any other employee. W. J. Read, in charge of meter reading and collecting for the Central Power Company, Grand Island, Neb., points out the importance of the meter reader's duties as follows:

"The opinion of the company held by about nine-tenths of the customers of any utility company is made by the meterman. The greeting the meterman gives the customer when the latter answers the knock on the door, the pleasantness of his smile, the politeness with which he asks to read the meter, and his 'thank you' upon leaving, go far toward establishing the feeling the customers have toward the company.

"The meterman's job is not an easy one. He must be a diplomat and a gentleman; he must have tact and patience and an easy working smile; he must make the customers feel that it is a pleasure to call, not just to read the meter, but to keep in closer touch with them and find out if the service has been good—if the iron or washing machine is giving any trouble—and to take notes relative to any improper condition.

"The average meterman will say that he does not have time to bother with such matters, but he should always remember that his company is in the same position as a merchant selling goods and that satisfied customers are the best advertisement in the world. The customer has every right to expect courteous treatment and cordial interest in his requirements, and every effort made along this line will be rewarded with more pleasant public relations.

"If you cannot meet and care for the public in this spirit, if you cannot or will not be courteous and helpful and gracious and pleasant every step of your way with the public and your fellow employees, don't try to be a meterman."

What the Public Thinks of Government Ownership

REFRESHING indication of the growing sentiment against government ownership and operation of public utilities is found in the testimony recently presented before the Massachusetts Legislature's joint committee on power and light. Petitions had been made for the appointment of a special commission on the advisability of the acquisition by the state of public and private gas plants, and at the hearing E. W. Burnstead, representing the Massachusetts Civic Alliance, arraigned the failure of government operation in the following manner:

"A move for government ownership means not only that the government shall step into the business being run by private enterprise, but it means that private enterprise shall step out of this business and be excluded, and if that is done in the case of one line of industry, why not in other lines of industry?

"There is one argument usually put forward on this proposition, that of better service at less cost. That is based solely upon an assumption that government operation is less costly and more efficient than private control, but that assumption has never been proved.

"Government business is less efficient, for generally those who manage it are started in at the top and not from the bottom up, while in private business the managers are developed from office boys running up to the top. The heads of a government enterprise are frequently changed through elections and by appointment. If they develop a special ability, their heads may go off at any moment, and the department suffers loss and the government business becomes a failure. It is not necessary to remind you of the failures of government operation of the steam roads, the express service, steamships, the telephone, telegraph and airplane industry. Every man's pocketbook has been taxed and will be for years because of the gross extravagance, waste and profligacy of those services."

This testimony before the Massachusetts Legislature was given by a lay citizen not an employee or an officer of any public utility company. It indicates, however, the trend of public sentiment with regard to government ownership or operation, of which there have been so many sorry examples during the past few years. People do not soon forget the waste and extravagance of government operation, particularly when the after effects continue to be felt in higher taxes and poorer service.

Increasing Use of Higher-Wattage Lamps

UNDER the recently established residential lighting rate of the Hartford (Conn.) Electric Light Company a 60-watt lamp can be burned at a cost 10 per cent below that formerly charged for service with a 40-watt lamp. In various ways the company has advertised this rate change advantageously, but there is a particularly effective display, illustrated herewith, at the lamp exchange and sales windows in the company's main office. As a result of placing a printed notice calling attention to the economies of the new rate beside the window, about 1,500 additional watts per week has been sold in place of renewals or purchases of the smaller size named.

THIS NOTICE INCREASED THE SALES OF LARGER SIZE LAMPS

What Other Companies Are Doing

Chicago, Ill.—The Public Service Company of Northern Illinois between Jan. 1 and July 15 obtained 1,424 contracts for house wiring, which is 100 per cent more than during the same period in 1921 and even exceeds the contracts taken during the first six months of 1920. Power contracts were also greater, as the new 1922 business was equivalent to 75 per cent of the load involved for all new contracts in 1921. Electric ranges numbering 75 per cent of those connected in 1921 were installed during the past six months.

New Hampshire. — The Twin State Gas & Electric Company is building 55 miles of 33,000-volt transmission line between Gorham, N. H., and St. Johnsbury, Vt. This line will connect the Gorham hydro-electric station and the one steam station and four hydro plants in the company's St. Johnsbury division. It is estimated that the cost of the line will be saved in three years through elimination of steam operation and by affording an outlet for secondary hydro-electric energy developed in the St. Johnsbury division.

Providence, R. I.—In two issues of stock employees of the Narragansett Electric Lighting Company purchased 2,261 shares, of which only 314 shares have since been sold. In other words, of all stock purchased by employees, 86 per cent is still held by them. A third opportunity to purchase has now been announced, and each employee of one year's standing or more may subscribe in the ratio of one share for each $300 of his or her annual wages, not to exceed twelve shares to any one employee. The company offers a bonus of $1 per share per year for five years beginning Sept. 1 to subscribers remaining in its employ and keeping the stock.

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

Beaumont - Monteux Hydro - Electric Plant.—J. REYVAL and J. SUET.—Situated near the junction of the Isère with the Rhone, an adjustable dam has been erected across the former river, which creates a useful head of from 10 m. to 11 m. with an average water flow of 328 cu. m. per second. At present seven vertical-shaft Francis spiral turbines of 6,400 hp. each, at a speed of 107 r.p.m., are installed. Three-phase, umbrella-type generators, wound for 6,200 volts and 50 cycles, are mounted above the turbines. An 80-kw., 250-volt exciter is keyed to the end of the vertical shaft. An outdoor step-up station contains five banks of three single-phase transformers each, rated per bank at 10,000 kva., 6,200 volts delta to 120,000 volts star. An outdoor switching station contains steel-aluminum busbars, suspended on eight-disk Hewlett chains, thirty-six single-pole, 120,000-volt oil switches, twenty-three three-phase, 6,000-volt oil switches, a set of electrolytic aluminum arresters and the necessary measuring transformers.—*Revue Générale de l'Electricité*, May 27 and June 3, 1922.

The Quality of Hydro-Electric Service.—ALEX. E. BAUHAN.—An article relating to quality of service that is to be expected from a properly equipped and well-operated hydro-electric plant, showing how by indefatigable effort such service now compares very favorably with and in many cases is better than that rendered by the metropolitan steam plant.—*General Electric Review*, June, 1922.

Generation, Control and Switching

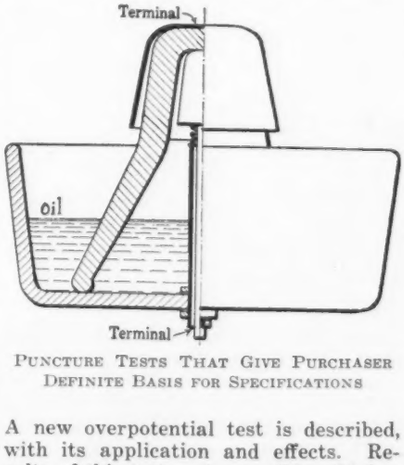
New Switching Stations for 100,000 Volts and 125,000 Volts.—H. PROBST.—All the different stations described in this interesting paper are of the indoor type, which, with the present situation and labor cost in Germany, results in a less expensive layout. However, there seems to be also another factor which very forcibly leads the way to the indoor type, and that is the general use of paper-made high-voltage insulators, which can be utilized only under roof. Porcelains for very high voltages are at present almost unobtainable in Germany. The first 100-kv. switching stations were built four stories high. Later the two-story station came into general use. As long as horn-gap lightning arresters were employed, the upper story had to be made very high to provide the necessary head room for the safe operation of the horns. Since the advent of the Petersen coil, obviating any other overvoltage protection, the two-story stations are being built with a much lower upper story, which now serves only to house the buses. The author shows on actual station layouts various favorable arrangements of transformers, switches and buses. In all earlier plants great attention was paid to the fireproof separation of all oil-containing apparatus. Based upon the German experiences, statistics seem to indicate that this expensive precaution is not essential.—*A. E. G. Mitteilungen*, June, 1922.

Transmission, Substations and Distribution

Mechanical Characteristics of Aluminum-Steel Conductor.—M. SUZUKI.—The topics covered in this paper are the distribution of tensile load between the two metal components of aluminum-steel cable, with stress-strain diagram of such a cable, and the effects of temperature upon mechanical stress in aluminum-steel cable.—*Journal of the Institute of Elcctrical Engineers of Japan*, June, 1922.

Units, Measurements and Instruments

Overpotential Test for Insulators.—G. W. LAPP.—Factors met in the design of insulators and characteristics of routine electrical tests are discussed.



PUNCTURE TESTS THAT GIVE PURCHASER DEFINITE BASIS FOR SPECIFICATIONS

A new overpotential test is described, with its application and effects. Results of this test make possible a higher standard of practice in the manufacture and use of transmission-line insulators. In the test the insulator is placed in an insulating dish, as shown in the accompanying illustration, which holds a sufficient depth of oil to form an electrical flashover seal at the rim of the insulator and at the same time leave the head and central part of the shell exposed to the air. The inside terminal is connected with a conductor passing up through the center of the dish. In this way flashover is prevented at the chosen testing voltage.—*Journal of the A. I. E. E.*, July, 1922.

Electric Flashover of Porcelain.—A. SCHWEIGER.—The results of a great many tests to determine the flashover strength of porcelain are reported. The author comes to the conclusion that the dry flashover in air is nothing else but the breakdown of a path of air and that all laws governing the air breakdown apply alike to the air flashover of a porcelain insulator.—*Elektrotechnische Zeitschrift*, June 29, 1922.

Illumination

Highway Lighting Units That Eliminate Glassware for Street Lighting.—SAMUEL G. HIBBEN.—Standard nomenclature and classification of street-lighting globes is necessary if the specifications and contracts are to be intelligently written. This article discusses the progress of the work, showing how the setting of limits for weight, brightness or diffusion and transmission efficiency is going forward. When the standardization of sizes and dimensions is more fully accomplished, much of the unnecessary cost of street-lighting glassware will be obviated.—*Electric Journal*, May, 1922.

Good Lighting an Essential in the Efficient Conduct of Business.—J. H. O'HARA.—In factory lighting each lamp should be so placed that the eye does not see it in the ordinary course of work and so shaded or covered that brilliant reflections are avoided. The effects of good illumination are reduction of accidents, greater accuracy in workmanship, increased production, less eye strain, better working and living conditions and greater ease in the supervision of men. The factors discussed are type of reflectors, indirect lighting, spacing of units, yard lighting, flood lighting and maintenance. The securing of expert assistance in dealing with problems in illumination is emphasized.—*Electrical News*, July 1, 1922.

Motors and Control

The Use of Dielectrics in Condensers.—C. F. GUILBERT.—In the design of condensers for the correction of the power factor of motors and lines a number of electrical details have to be considered very carefully to insure a lasting product. Among important points that should have careful attention are the maximum field density safely permissible, the density near the edge of the conductor, heat losses due to the discharge, heat losses due to dielectric hysteresis, and the physical and chemical fatigue of the dielectric. The author deals in the paper mainly with the effect of entrapped air, the intensity of the dielectric field and the border effect on power condensers.—*Revue Générale de l'Electricité*, June 3, 1922.

Safety Precaution in Paper Mill.—GEORGE E. WALLIS.—Several examples of machines provided with various safety devices in paper mills are given,

and various methods of procuring the proper protection of the machines are pointed out.—*National Safety News*, July, 1922.

Improvements on Centrifugal Slip-Ring Short-Circuiting Devices. — P. SUTER.—This paper gives descriptions, drawings and photographs of the latest developments of such centrifugal switches for use on motors up to 2,200 kw. and 3,600 r.p.m. According to the size and the speed of the motor, the contacts of these switches can be safely designed for current densities as high as 0.4 amp. per square millimeter contact surface.—*Brown-Boveri Mitteilungen*, July, 1922.

Heat Applications and Material Handling

Heating of Hydro-Electric Plants.—G. SULZER.—Five per cent of the water-turbine energy transformed into electric power in the generator is, on an average, converted into heat and imparted to the air. In two Swiss plants this heat is being utilized by a carefully laid out hot-air-heating system which keeps all the rooms of the entire power station at a satisfactory temperature during the winter months. The generator capacities of these two plants are 25,000 kw. and 50,000 kw. respectively. Specially installed blowers force the circulation of the heated air through an elaborate system of air ducts, ending in registers in the different rooms.—*Bulletin of the Schweizer Elektrotechnischer Verein*, June, 1922.

Electric Pig Iron Furnace. — L. FAHNRICH.—A furnace is described for reducing iron ore into pig iron that is coming in general use in Austria. This is an arc furnace, suitable for single-phase or three-phase as well as direct current, using a number of electrodes, the number depending upon the size of the furnace. As a rule 600 kw. per electrode of 650-mm. diameter gives best results. The voltage may be 50 to 100, with about eight regulating positions. Depending upon the size, these furnaces operate at from 0.85 to 0.90 per cent power factor. For 1,000 kg. of pig iron 2,600-kw.-hr. of energy and 6 kg. of electrodes are required as an average. At the same time about 500 cu. m. of gas are generated, with a caloric value of some 2,250 heat units, equivalent to 230 kg. of anthracite coal.—*Elektrotechnik and Maschinenbau*, July 2, 1922.

Electrophysics, Electrochemistry and Batteries

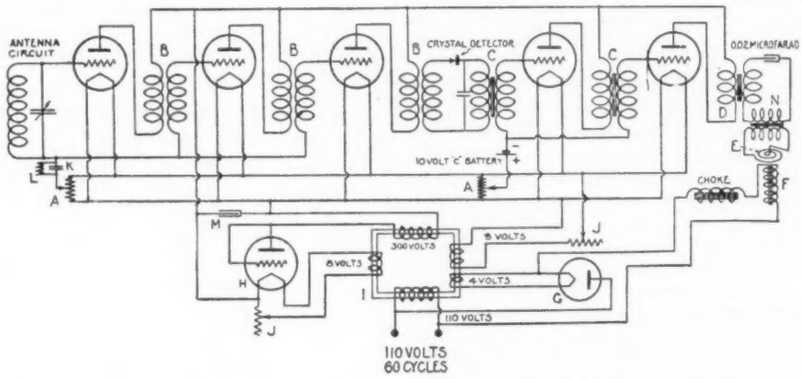
Raw Materials for Electrode Manufacture.—CHARLES L. MANTELL.—The physical and chemical properties of the carbonaceous substances and binding materials are reviewed from the standpoint of electrode requirements. Petroleum coke and pitch are the principal raw materials in the manufacture of electrodes. A satisfactory electrode for electrothermic purposes may be high in ash, since its resistivity is either unimportant or else can be sacrificed if a cheaper electrode may be employed. On the other hand, in electrolytic work electrodes must have a low resistivity and be as free as possible from contamination.—*Chemical and Metallurgical. Engineering*, July 26, 1922.

Traction

Operation of Single-Phase Interurban Railway —C. N. WILCOXON.—The 100 miles of electrified track of the Chicago, Lake Shore & South Bend Railway has shown exceptional performance and reliability in high-speed service. The present service and operation of both the passenger and freight traffic are reviewed. The system operates on 25-cycle, single-phase alternating current with trolley potential of 6,600 volts, which is stepped down from the transmission system of 33,000 volts. Special features discussed are schedules and traffic, handling of peak loads, trailer-car service, rolling stock, high-tension apparatus and the development of freight traffic.—*Electric Traction*, June, 1922.

Telegraphy, Telephony, Radio and Signals

Development of an Electron-Tube Amplifier.—P. D. LOWELL.—The paper



THIS FIVE-STAGE AMPLIFIER USES CRYSTAL DETECTOR AND IS SUPPLIED WITH 60-CYCLE ALTERNATING CURRENT TO FILAMENTS AND PLATES

A—Balancing resistances.
B—Radio-frequency transformers.
C—Audio-frequency transformers.
D—Telephone transformer.
E—Armature of loud speaker.
F—Field of loud speaker.
G—Tungar rectifier.
H—Plate voltage rectifier.
I—Power transformer.
J—Filament rheostats.
K—Condenser, 1 mfd.
L—Leak resistance, 2 megohms.
M—Smoothing condenser, 10 mfd.
N—Step-down transformer for loud speaker.

describes a five-stage amplifier which operates satisfactorily on 60-cycle supply for both filaments and plates. This amplifier has three radio-frequency stages and two audio-frequency stages and uses a crystal detector. The interference from the 60-cycle supply is practically eliminated by balancing resistances, grid condensers and special grid leaks of comparatively low resistance, a telephone transformer in the output circuit and a crystal detector instead of an electron-tube detector. The paper gives circuit diagrams, the final complete circuits for the five stages being reproduced, and states the values of the condensers, resistances and inductances used.—*Journal of the A. I. E. E.*, July, 1922.

Electric Switch and Signal Setting Apparatus. — L. PAHIN. — A motor-operated block system is described which has been installed recently on the French northern lines. Semaphores and switches are set with 110-volt direct-current motors operated over battery-energized relays. The usual interlocking system renders the apparatus safe from the railway standpoint. All motors operate in both directions to open or to close the signal or the switch and are connected to the control tower with four-conductor cables. To set a switch requires 3½ amp. for three and one-half seconds; to set a signal takes 2 amp. for one and one-half seconds. The relays consume permanently 0.05 amp. The article is eight and a half pages long and is well illustrated.—*Revue Générale de l'Electricité*, July 8, 1922.

Miscellaneous

The Microstructure of Babbitt Metal. —A. MCARTHUR JOHNSTON and R. W. IRWIN.—A microstructure investigation shows that the rigid control of temperature is the most important consideration in manufacturing babbitt, as its physical properties can be changed almost at will by the alteration of the mixing and pouring temperatures. The results of research in the manufacture of babbitt are ably covered in this article with line drawings and several microscopic photographs.—*Journal of the South African Institution of Engineers*, May, 1922.

Integral Equation for Skin Effect in Parallel Conductors.—CHARLES MANNEBACK.—A general set of integral equations is calculated giving the theoretical solutions of the current distribution in parallel conductors. It is shown that current losses in a conductor at low frequency vary as the square of the frequency, while at high frequency they vary as the square root of the frequency.— *Publication No. 30 of the Institute of Technology.*

Scientific and Industrial Research

A Department Devoted to Reports of Investigations Contemplated or Completed, Research Facilities Available and Suggestions for Co-operative Work

Conducted by PROF. VLADIMIR KARAPETOFF, *Cornell University, Ithaca, N.Y.*

[PRINTED IN THE THIRD ISSUE OF EACH MONTH]

[When investigations which have been completed are, in the opinion of the editors, of wide enough interest to the field we serve, details thereof will be presented in other parts of this paper. Contemplated research or that which appears to have limited appeal will be only briefly reported in this section, but details may be had by communicating with the investigator or institution named in the report. Readers are referred to the department "Digest of Electrical Literature" for investigations reported in other journals. The news and engineering sections should also be followed for research reported before technical societies.]

Research Completed

Arc-Light Projector for Taking Moving Pictures.

The positive carbon is fed automatically by a small shunt motor connected across the arc. Changes in the length of the arc are immediately reflected in the motor voltage, causing the motor to take a proper corrective measure. In addition to being fed forward, the positive carbon is rotated, which insures the burning of a large and even crater.—*Electrical Apparatus Committee of the N. E. L. A.*

Controller, Magnetic.

A very important development in magnetic control equipment has been perfected and put on the market during 1921. This consists of a new design of contactor which makes it possible to obtain a steel mill controller with contacts and arc chutes having a life from fifteen to twenty times greater than formerly. Instead of castings, the parts are made, as far as possible, of pressed steel or punchings, which are light in weight and very uniform. The result is a quicker operating switch of greater reliability. These contactors are used in a line of magnetic controllers utilizing the voltage drop relay scheme of current limit acceleration.—*Electrical Apparatus Committee of the N. E. L. A.*

Regulator, Potential, Reversing-Switch Type of.

This regulator is sensitive only to the maximum permissible variations of potential, say ±5 per cent from normal. The potential is brought back to normal by means of a transformer whose primary may be either short-circuited or excited in either direction according to the position of a three-way switch. The magnets operating the latter are controlled by contact-making relays which respond to the potential variations. The switch may also be used with a regulator of the variable-ratio type. In the three-phase form a single potential circuit will take care of the regulation in all phases simultaneously. The advantages claimed are simplicity, reliability and low cost.—*Angelo Bianchi, Milan, Italy.*

Oscillograph, Cathode-Ray Type.

A cathode-ray oscillograph has been developed which operates on 300 volts instead of the 10,000 to 50,000 volts required with the older forms of Braun tube. The low-voltage operation is secured by using a thermionic cathode as the source of the cathode rays. The tube has a high sensitivity, the deflection being 1 mm. per volt applied between the deflector plates, or 1 mm. per ampere-turn in suitable deflector coils. The simplicity of the auxiliary apparatus and the sensitivity promise to make this oscillograph an inexpensive and useful instrument for low frequency as well as for high-frequency work.—*J. P. Johnson, Western Electric Company, New York City.*

Underground Temperature Surveys in Duct Banks.

Extensive underground temperature surveys have been made in duct banks by means of gang cables of thermocouples, approximately 350 ft. long. These gang cables are built up beginning with a ¾-in. steel-wire rope to which the thermocouples are attached. The thermocouples are spaced every 30 ft. and the pair of leads to each one brought back to one end of the cable. Four layers of tape are used to protect the cable from abrasion and moisture.—*E. J. Rutan, in the A. I. E. E. Journal, June, 1922.*

Oil, Transformer, Moisture Test of.

Freshly cut sodium dropped into the oil to be tested is a convenient and sensitive means of detecting traces of moisture. Evolution of gas bubbles is produced by smaller quantities of moisture than can be detected by the usual test of rubbing the oil with eosin.—*C. C. Kiplinger, Mount Union College, Alliance, Ohio.*

Steam Apparatus, Supervision of, with a Graphic Ohmmeter.

In many industries an abnormal condition is indicated by a change in the ohmic resistance. The device, as developed, will indicate, for example, when a tube in a surface condenser begins to leak, the boilers prime, or what the concentration of salts in a boiler is. With suitable electrodes this instrument will record changes in resistance continuously.—*J. W. Esterline, Indianapolis, Ind.*

Dielectrics, Molded, Tests at Radio Frequencies.

A standard test has been developed for non-vitreous solid insulating materials formed in molds by the application of pressure. The phase difference is measured at a known frequency by determining the effective resistance and capacitance of a condenser made of the material under test. The dielectric constant is calculated from the measured capacitance and the dimensions. The dielectric power loss is proportional to the product of the dielectric constant and the phase difference.—*Committee on Electrical Insulating Materials, American Society for Testing Materials, 1315 Spruce Street, Philadelphia, Pa.*

Turbines, Steam, Vibration Test, Dynamic.

The wheel disks are caused to vibrate while revolving at various speeds until a point is reached at which the wave of disk vibration—traveling against the direction of rotation—attains the same speed as the wheel. This results in a stationary wave which may ultimately result in fracture. It is possible to test wheels in place in the field, and their sensitiveness to vibration at operating speeds can be definitely determined. Wheels which are subject to certain kinds of vibration at or near the normal operating speed are considered dangerous, and their replacement by wheels with a different cross-section is recommended.—*General Electric Company, Schenectady, N. Y.*

Heating, Electric, of Water for Residences.

Tests have been made on a 30-gal. storage tank, with water temperature about 100 deg. F. above that of the room. The tank was lined with hairfelt of different thickness and radiation losses were measured. The importance of thorough insulation in reducing the losses has been amply demonstrated. A thickness of hairfelt of about 2 in. is sufficient, and the reduction in the losses beyond this limit does not warrant a further increase in the thickness of insulation.—*Hydro-Electric Power Commission, Toronto, Ontario.*

Thermometers, Total Versus Partial Immersion.

A study has been made of the errors involved when a thermometer calibrated for total immersion is only partly immersed in a bath, and vice versa. In one case at 210 deg. C. the error was 3.2 deg. C. and at 355 deg. C. the error was 15.6 deg. C. The committee recommends three standard types of thermometers for general use, all of the partial-immersion type (76 mm. immersion), to cover the following ranges on the centigrade scale: —20 deg. to +150 deg.; —5 deg. to +300 deg.; —5 deg. to +400 deg. Detailed specifications have been prepared for such thermometers in co-operation with the manufacturers and users of thermometers, and with the United States Bureau of Standards.—*Committee on Thermometers, American Society for Testing Materials, 1315 Spruce Street, Philadelphia.*

Gloves, Rubber, for Electrical Workers.

Changes and additions have been made in standard specifications and in prescribed tests.—*Rubber Products Committee of the American Society for Testing Materials.*

Research in Progress

Switchboard Matting.

A request has been received from the accident prevention committee of the N. E. L. A. to prepare specifications for matting to be used about electrical switchboards and in similar situations where an electrical hazard is involved. The subcommittee on protection of persons from electric shock has undertaken the development of such specifications.—*Rubber Product Committee of the American Society for Testing Materials.*

Suggestions for Research

Temperature Regulation, Automatic.

With the increasing use of electric furnaces and ovens in various industries, it becomes highly desirable to develop an automatic temperature regulator with which the time-temperature curve could follow any desired program. The principle of such a device was shown by the Foster Instrument Company at a recent exhibition of the Physical and Optical Societies in London, England.

Insulation, Textile, X-Ray Examination of.

The control of textile operations is facilitated by a periodic X-ray examination after each important operation. Certain chemicals have been found with which the fiber can be impregnated for such tests without injuring it. It is thought that similar tests may be applied to the study of electrical insulating materials having a textile basis.—*See Textile Institute Journal, Vol. 12, 1921, page 1.*

Rectifier, Vibrating-Contact Type.

In small sizes such a rectifier is quite efficient for charging storage batteries, provided that the contact is made and broken when the a.c. voltage is equal to that of the battery. Recently L. Schüler has given the fundamentals of motion of such vibrating contacts and described a stroboscopic method of experimental observation of their motion (*E. T. Z.*, Vol. 42, page 481). It is hoped that this work will be used by other investigators for a further practical improvement of existing rectifiers of this type.

Grounding Portable Devices.

The grounding of portable devices is not always easy, as there is a hazard introduced in grounding through the grounded circuit wire. If an additional ground wire is supplied in portable cord, what is a feasible arrangement at the attachment plug and receptacle for insuring a ground connection for the extra conductor?—*M. G. Lloyd, Bureau of Standards, Washington, D. C.*

Receiver, Telephone, Efficiency of.

Various measurements indicate a very low efficiency of the telephone receiver, considering it from the point of view of the transformation of the incoming electrical energy into that of air vibrations. See, for example, Shepardson, "Telephone Apparatus," page 81. With the increasing importance of loud-speaking telephones, the matter of increased efficiency of the receiver acquires a particular importance, and further accurate investigations are desired with the view of analyzing the causes of the principal losses and finding suitable remedies.—*Editorial Suggestion.*

Cables, Study of Paper and Petrolatum for.

The paper by Del Mar and Hanson, *A. I. E. E. Journal*, 1922, page 439, opens a new and fruitful field of investigation of the electrostatic stresses, dielectric displacement currents and conduction currents in a composite insulation consisting of paper and mineral oil. Further and more extensive studies with more delicate apparatus should lead to important practical results.

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Federal Courts Upheld

American Bar Association Is Opposed to the Bacharach Bill and Similar Radical Legislation

AT SESSIONS of the American Bar Association held in San Francisco on Aug. 7 to 11 discussion on the Bacharach bill and similar legislation resulted in the adoption of resolutions placing the association definitely on record as opposing that type of legislation. At a meeting of the Public Utility Section of the association Aug. 8 the following resolution was adopted:

"Resolved, That the Section on Public Utility Law of the American Bar Association hereby expresses the emphatic opposition of its membership to the Bacharach bill now pending in Congress (H.R. 10,212) and to any similar legislation designed to limit or destroy, as to any particular class of litigants or rights, the present equitable powers of the federal courts to enforce the guaranties of the federal Constitution for the protection of persons and property.

"Resolved, further, That the section asks its chairman in his report to the association to present at least in outline the considerations which have been developed in the discussions before the section as demonstrating the extreme unwisdom of any such radical curtailment of the federal judicial power.

"Resolved, further, That the chairman of this section and the special committee created at today's session are authorized in behalf of the section to take such further steps as in their judgment may be advisable to bring about an indorsement by the association of the action of its committee on jurisprudence and law reform in actively opposing the Bacharach bill at the present session of the Congress, and also to support before the association any suitable resolutions which may be offered in condemnation of that or similar legislation."

JURISPRUDENCE COMMITTEE'S REPORT

At a general session of the association Thursday, Aug. 10, the committee on jurisprudence and law reform, Henry W. Taft, chairman, presented its report. It included as a part of the report the resolution adopted by the Public Utility Section and expressed definite opposition to the Bacharach bill as follows:

"Three hearings have been had upon this bill. At one of these a member of this committee, Mr. Harriman, attended and pointed out the objections to it upon the grounds referred to in these previous reports. The chairman also presented a similar statement. After considering the subject carefully this committee unanimously voted that it disapproved the bill. Information as to this vote has been presented to the judiciary committee of the House, which has had the matter under consideration."

The committee report was unanimously adopted by the association.

Crude Petroleum and Poles on Free List

An effort made in the United States Senate on Wednesday to impose a duty of 35 cents a barrel on refined and 25 cents a barrel on crude petroleum was defeated by a vote of forty-five to nine, the mover of the resolution—Senator Harreld of Oklahoma—coming in for attack as personally interested in the proposed duty because of a part interest in an oil well.

Telegraph, telephone, electric light and other poles were, by amendment, put on the free list.

New York Utilities Ask Their Customers to Save

Over the signature of "The Gas and Electric Companies of Greater New York," the newspapers of New York City carried this week an advertisement headed "Important Notice" and addressed "to the consumers of gas and electricity in the city of New York" which in the following terms urged the public to economize in the use of these commodities:

"On recommendation of the Governor's State Fuel Commission and of the Public Service Commission of the State of New York you are earnestly requested to give careful consideration to the following suggestions in connection with the utilization of the services supplied by the gas and electric companies of New York City.

"It is absolutely necessary during the present scarcity of fuel that the consumers of the public utilities co-operate in every practical way in the saving of fuel and the elimination of waste.

"*Burn fewer lights.*—Save gas and electric current.

"*Turn them off when not needed.*—Do this when leaving a room or office whether you are paying for it or not.

"*Conserve all heat and power.*—Remember that the waste of light, heat or power is a loss of coal. Keep in mind daily the necessity during the present emergency for the utmost economy in the use of facilities requiring the consumption of fuel."

Coal Strike Virtually Ended

Agreement Being Reached in All of the Producing Centers and Speedy Resumption Indicated

BY THE agreement reached in Cleveland this week between the union representatives of the striking miners and the operators the long-drawn-out coal strike has been virtually terminated. Although up to the present not all of the districts have signed the agreement, it is expected that acquiescence in it by all operators will follow soon. The anthracite-coal operators will probably also come to an agreement with the hard-coal miners within a very short time. Inasmuch as the old wage scale remains, hope for cheaper coal vanishes.

The operators are confident that soft coal can be produced at a rate considerably larger than normal, so that within a few months depleted bins may be completely replenished. There are no indications, however, that the regulations with reference to the distribution of coal by the President's coal committee can be abrogated until next spring. Electric light and power companies in various sections have sent out requests to customers to be frugal in the use of electricity so that their diminishing coal supplies may last until shipments begin to arrive again.

The railroad strike is causing most concern, but men who are in close contact with the situation expect the lowering clouds to disappear within a very short time. Until the railroad strike is settled on the coal-bearing railroads at least, there is no possibility of moving any considerable amount of fuel. A conference between railroad executives and union officials was held in New York the latter part of this week. Out of this conference it is expected an agreement will come which will bring the railroad strike to a speedy end.

Fuel Situation in the Middle West

Although no large electric plants in Iowa have curtailed service from lack of coal, several municipal plants have suffered. Report sfrom Rex H. Fowler, secretary of the Iowa Section of the National Electric Light Association, indicate that the coal situation is serious but that with the aid of fuel oil operation will be continued until coal is available.

A meeting of Ohio central-station men was held in Cleveland on Wednesday to discuss procedure in case actual curtailment of service becomes neces-

sary. No immediate shortage in Cleveland is feared.

The Wisconsin Traction, Light, Heat & Power Company has only a ten days' supply available.

Boston Coal and Percentage Charges Sustained

Four appeals to the Massachusetts Department of Public Utilities against the coal clause and so-called percentage charges of the Edison Electric Illuminating Company of Boston were ordered dismissed in a twenty-four-page finding of the commission issued last week, pending the adjudication before the board of the existing rate inquiries involving the company. Three mercantile establishments and the city of Boston sought to escape fuel and percentage payments, and the municipality sought to recover money thus paid by it to the company and described by its counsel as "reparations." The petitioners cited recent reductions under the coal and percentage clauses to so-called Schedule A customers (comprising the great mass of consumers) and evidenced as discrimination the existence of certain long-term contracts made some years ago with consumers who up to now have not been required to pay these additional charges.

The pendency of the exhaustive rate inquiry before the commission contributed in large measure to the board's action in dismissing the four petitions, although the petitioners are allowed sixty days in which to request that their prayers stand until the adjudication of the main case. The company claimed that all four of the petitioners are paying less per kilowatt-hour than the Schedule A customers, and if this is so the finding declares the alleged discrimination is more one of form than of substance. The board questions whether under these circumstances the existing lower charges paid by these petitioners should be reduced still lower in comparison with those made to the vast majority of customers, particularly in view of the main contention of the complainants in the rate inquiry, viz., that the customers under Schedule A, including these very four complainants, are paying more than they ought in proportion to other classes of consumers.

The petitioners and the company were unable to agree upon any reasonable basis for suspending payments under the coal and percentage clauses until the ultimate determination of the main inquiry. The petitioners argued that unless repayments or so-called reparations by the company to the city can be granted by the board they cannot be had through the courts under a recent decision of the Massachusetts Supreme Court against the city of Boston, and that as a consequence no redress can be obtained by those who may be injured in case of excessive or discriminatory rates. The commission points out that the statutes contain nothing which would seem to indicate an intention to give the board the power to order reparations. The commission calls attention to the desirability of legally requiring all gas, electric and water rates to be filed with it before taking effect as a means of making it difficult for any company to put into use rates either excessive or discriminatory.

Competitive Situation in Indianapolis

The protests of the Indianapolis Light & Heat Company and the Merchants' Heat & Light Company of Indianapolis against granting a certificate of convenience and necessity to the Terre Haute, Indianapolis & Eastern Traction Company for the installation of electric power lines in Indianapolis have been overruled by the Public Service Commission of Indiana. The effect of granting the proposed certificate, it was said, would be to permit the railway companies to compete with the two companies now providing electric service for Indianapolis. The commission expressed doubt whether the certificate should be granted, but was convinced of the necessity of relief being granted the petitioning company, which has won the approval of the city for its proposal.

Further reductions in rates of the Indianapolis Light & Heat Company and the Merchants' Heat & Light Company applicable to larger consumers have been requested in a petition filed by attorneys for a number of business concerns and industries. The present rates went into effect July 1.

Indiana Cities Are to Unite in Opposing Rate Increases

An organization to oppose increases in utility rates and to bring about amendments to the Public Service Commission law and other legislation was agreed on by mayors and city attorneys of several Indiana cities at a meeting held recently at the invitation of Mayor John C. Quick of Muncie. The cities represented at the meeting were Indianapolis, South Bend, Hammond, Gary, Anderson, Newcastle, Elwood, Crawfordsville, Vincennes, Muncie, Whiting and East Chicago. Other places are expected to join the movement.

Vigorous attacks on the Public Service Commission law were made, especially by Mayor R. O. Johnson of Gary, who argued that it should be repealed and rate making and control of utilities should revert to city councils. Most of the city attorneys present, it is said, opposed repeal of the basic law, but urged the need of amendments designed to open the way to a stronger presentation of the "case of the people" than under the present operation of the law.

With the next Legislature about five months distant, sentiment against the Public Service Commission is being encouraged actively in some districts.

Ontario Hydro's Rebuttal

The "Murray Report" to N. E. L. A. Is Declared Unjust and a Vigorous Attack Made on Its Author

UNDER the unabridged heading "Refutation of Unjust Statements Contained in a Report Published by the National Electric Light Association Entitled 'Government Owned and Controlled Compared with Privately Owned and Regulated Electric Utilities in Canada and the United States' Respecting the Hydro-Electric Power Commission of Ontario," the body last named has issued a fifty-three-page pamphlet which assails with great vigor the statements made in the report referred to, of which W. S. Murray and Henry Flood, Jr., were the authors. A "foreword" to this pamphlet is contributed by Sir Adam Beck, the chairman of the Ontario commission, in which he says:

"Mr. Murray has made definite statements purporting to be true but which are at absolute variance with well-known facts. He has misquoted statements, even replacing significant words therein with others. He has employed partial and misleading data, thereby arriving at conclusions which cannot for a moment be supported if the correct data be employed. He has presented grossly misleading statements respecting even physical facts within his knowledge, and he has made comparisons between entities radically different, when even a proper recognition of the real differences would have created an impression entirely at variance with what he has represented. He has inflated costs in a manner which falsifies the conclusions. Such procedure is characteristic of the use made of much of the essential material embodied in the premises which Mr. Murray has adduced and upon which he has based his conclusions. This accounts for the worthless nature of such conclusions."

MANY INSTANCES OF ALLEGED INACCURACY ARE CITED

In support of these serious allegations Sir Adam Beck makes the following statements:

That the very title of Mr. Murray's report is misleading inasmuch as the phrase "government owned and controlled," in its usually accepted meaning, conveys a significance radically different from any which can be attached to the operations of the Hydro-Electric Power Commission of Ontario, which, Sir Adam says, "is co-operative, municipal ownership working through the agency of independent commission control and administration and is entirely removed from political interference."

That Mr. Murray's report is not "based on an impartial and exhaustive study," such as he says the N. E. L. A. requested, being neither exhaustive nor impartial and embodying fallacious

methods that render its conclusions necessarily unsound.

That Mr. Murray asserts, "The commission cannot be sued without fiat from the Attorney-General, and to date no fiat has ever been granted," whereas within the period from 1912 to date more than twenty-five such fiats have been granted.

That Mr. Murray misquotes the power commission amending act by altering the phrase "in respect of which authority is by this act conferred upon it" to read "in respect of that authority as by act conferred upon it," thus, in Sir Adam's opinion, creating the false impression that the jurisdiction conferred by the particular portion of the act cited relates to the operations of the commission as a whole instead of relating, as it does, only to comparatively unimportant features covered by the provision in question.

That Mr. Murray states that in 1920 the street-lighting cost per capita in Buffalo was 60 cents as compared with 67 cents per capita in Toronto, leaving out of account the fact that in Buffalo more than one-half the total number of street lamps are gas or gasoline, whereas in Toronto all the street lamps are electric. The correct figures for total lighting, Sir Adam says, are $1.15 for Buffalo against 67 cents for Toronto.

NIPIGON-KAMINISTIKWIA CONTROVERSY

That Mr. Murray asserts that the Nipigon development "lacks a storage equal to that available to the Kaministikwia plant," whereas the potential storage on the Nipigon watershed is more than nine times that on the Kaministikwia, and that his failure to direct attention to the "very special features distinguishing the water power of the Nipigon River" is an "unpardonable breach of professional integrity."

That throughout his report Mr. Murray "effects comparisons between data and circumstances which are often inherently and radically different." Sir Adam Beck instances as an unfair comparison that drawn in the Murray report between California and the Ontario hydro systems "other than the Niagara." These, says Sir Adam, represent only one-seventh of the Ontario Hydro system's load, and the only possible comparison would be between California and the system supplied from Niagara Falls.

That in dealing with hypothetical factors involving future circumstances Mr. Murray, "by inflation and other devices," overestimates the cost of the Niagara system by 75 per cent, even granting his own assumptions as to the amount of water available.

That so far from Mr. Murray's declaration that electrical energy is dearer in Hydro municipalities than in other territories to which he refers being true, the rates throughout the system are cheaper than for like service elsewhere in the world. For instance, Sir Adam says, average energy costs in Buffalo are 35 per cent higher than in Toronto, not 20 per cent lower, as Mr. Murray estimates.

More than 300 municipalities now served by the Hydro-Electric Power Commission of Ontario have, declares Sir Adam, saved through reduction of rates approximately $60,000,000 as compared with what would have been the cost under rates prevailing before the undertaking was begun.

The main portion of the pamphlet under notice is an amplification of the assertions made by Sir Adam Beck in the "foreword." It concludes with another arraignment of Mr. Murray, who is accused of employing "methods demonstrably reprehensible and unprofessional."

Bill to Reorganize Georgia Commission

A bill has passed the Georgia House of Representatives by which the name of the state commission has been changed from "Railroad Commission" to "Public Service Commission" and the membership of the body reduced from five to three. The bill provides an appropriation of $70,000 to pay the operating expenses of the commission, this sum to be collected from the public utilities on a pro rata basis, according to the ad valorem taxes they pay.

The commission is required by the terms of the bill to hold hearings in the local community of the utility in every contested rate case. The attorney for the commission is to act as a representative of the public in all contested rate cases and shall conduct or assist in conducting the case for the public.

Suit Against Southern Power Results in Mistrial

A suit brought by twenty-two cotton-mill companies against the Southern Power Company in an effort to upset advanced rates granted to the power company by the North Carolina Corporation Commission came to an end on Aug. 5 at Shelby, N. C., when the jury announced its inability to agree and the judge declared a mistrial. The trial had lasted two weeks, and the jury had been out twenty-seven hours. It stood from the first seven to five in favor of sustaining the existing rates as established by the commission. A very wide degree of public interest had been aroused by the action of the cotton mills in taking their contentions into court. They will now seek to carry the case to the North Carolina Supreme Court.

Two questions were put before the jury for decision: (1) whether the rates fixed for the company are unreasonable and unjust; (2) whether the regulations prescribed by the commission are unfair and unjust. A decision against the commission would have sent the case back to it for a rehearing. The increase granted by the commission was about half what the company asked for. All consumers were put on the same footing, in accordance with a decision of the Supreme Court of the state, and all existing contracts were abrogated. The new rates were accepted by 250 consumers, but the contending mills refused to abide by them, claiming that they were higher than those embodied in contracts with the Southern Power Company only a few months before.

A. I. E. E. Announces Committee Appointments

At the first meeting of the board of directors of the American Institute of Electrical Engineers for the administrative year beginning Aug. 1, 1922, held in New York on Tuesday, Aug. 8, President Jewett announced the committee appointments for the coming year. The chairmen are as follows:

Standing committees: Board of examiners, H. H. Norris, New York; code of principles of professional conduct, Schuyler Skaats Wheeler, Ampere, N. J.; co-ordination of Institute activities, W. I. Slichter, New York; Edison medal, Edward D. Adams, New York; executive, Frank B. Jewett, New York; finance, L. F. Morehouse, New York; headquarters, E. B. Craft, New York; law, H. H. Barnes, Jr., New York; meetings and papers, E. E. F. Creighton, Schenectady, N. Y.; membership, R. B. Howland, New York; publication, Donald McNicol, New York; public policy, H. W. Buck, New York; research, J. B. Whitehead, Baltimore; safety codes, H. B. Gear, Chicago; sections, A. W. Berresford, Milwaukee; student branches, C. F. Harding, Lafayette, Ind.; standards, Harold Pender, Philadelphia.

Technical committees: Educational, C. E. Magnusson, Seattle; electrical machinery, B. A. Behrend, Boston; electrochemistry and electrometallurgy, J. L. Yardley, Pittsburgh; electrophysics, F. W. Peek, Jr., Pittsfield, Mass.; industrial and domestic power, H. B. Reed, Milwaukee; instruments and measurements, P. A. Borden, Toronto; iron and steel industry, E. S. Jefferies, Hamilton, Ont.; lighting and illumination, G. H. Stickney, Harrison, N. J.; marine, G. A. Pierce, Jr., Philadelphia; mines, Graham Bright, Pittsburgh; power stations, R. F. Schuchardt, Chicago; protective devices, H. R. Woodrow, New York; telegraphy and telephony, R. E. Chetwood, New York; transmission and distribution, Edward B. Meyer, Newark, N. J.

EDISON MEDAL COMMITTEE

In accordance with the bylaws of the Edison medal committee, the board of directors confirmed the appointment by President Jewett of new members to serve on that committee, as follows: Gano Dunn, New York; F. A. Scheffler, New York, and W. R. Whitney, Schenectady, for terms of five years each. The board also elected three of its membership as members of the Edison medal committee for terms of two years each, namely, E. B. Craft, New York; G. Faccioli, Pittsfield, Mass., and William McClellan, New York.

American Engineering Council Has Water-Power Plan

With the whole federal water-power situation in what is called a critical condition, involving vast economic consequences, Dean Mortimer E. Cooley of the University of Michigan, president of the American Engineering Council of the Federated American Engineering Societies, and John R. Freeman, president of the American Society of Civil Engineers, will, it is announced, appear before a sub-committee of the Senate committee on commerce the latter part of this month to advocate the establishment of a national hydraulic laboratory. A bill to create such a laboratory is now before the Senate.

This action, it is stated, was prompted by "the Federal Power Commission's lack of effective and permanent personnel." The water-power plan coincides with the American Engineering Council's reforestation movement, in which the engineers are co-operating with the United States Forestry Service and other bodies. The executive board of the American Engineering Council, which is to meet in Boston on Sept. 8 and 9, has adopted a resolution declaring that stream-flow conditions in many sections of the country vitally affect the welfare of the people in many ways. Among these it instances the loss of life and damage to property resulting from floods, the economic significance of water-power developments and the importance of their industrial utilization.

Accounting Regulation Conference to Meet Sept. 18

The conference with Federal Power Commission officials on the accounting regulation has been fixed for Sept. 18. It had been the intention to have the meeting at an earlier date, but it was found that the date fixed would allow the representatives of the National Electric Light Association time to return from the Salt Lake City meeting and at the same time be a convenience to the representatives of the National Association of Railway and Utility Commissioners, who will be in the East just prior to that date, attending their Detroit convention.

Senate Formulates a Proviso Affecting All New Dams

In giving its consent recently to the construction of a dam across the Mahoning River at Warren, Ohio, the United States Senate not only provided that the dam must not be used to develop water power or generate electricity or be commenced until the plans have been approved by the Chief of Engineers, but also added another proviso which is likely to be a part of all future permits to construct dams for other than power purposes. This standardized clause reads as follows:

"That the consent hereby given shall terminate and be at an end from and after thirty days' notice from the Federal Power Commission or other authorized agency of the United States to said company or its successors that desirable water-power development will be interfered with by the existence of said dam; and any grantee or licensee of the United States proposing to develop a power project at or near said dam shall have authority to remove, submerge or utilize said dam under such conditions as said commission or other agency may determine, but such conditions shall not include compensation for the removal, submergence or utilization of said dam if the water level to be maintained in said power project is higher than the level of the crest of said dam."

Major Bennion Sees Western Power-Project Sites

Utah and Oregon must develop additional water power in the near future if the rapidly growing market in those states is to be kept supplied. This opinion was expressed by Major Howard S. Bennion, assistant chief engineer of the Federal Power Commission. Major Bennion has just returned from an inspection trip which included visits to the Flaming Gorge and the Bear River projects, those between American Falls and the Seven Devils country on Snake River, the proposed development of the Pacific Power & Light Company above Lewiston, and the developments at Flathead Lake. In addition he visited Butte and Great Falls to study the manner in which the copper companies make use of their power.

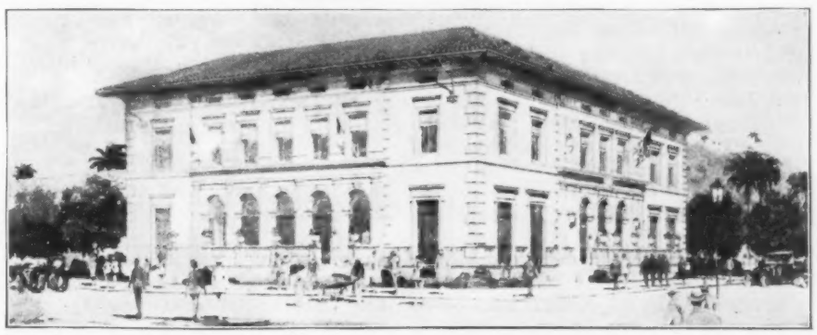
Major Bennion was surprised at the rapid rate of increase in the load being carried by the Utah companies. He states that the Utah Power & Light Company is planning to proceed with its four projects on the Bear River in the near future.

The situation in Idaho, Major Bennion states, is going to be unsatisfactory until a larger market is found for firm power. At present a large part of the market is for pumping enterprises. Irrigation demands cheap power, but before low rates can be put into effect some use for the power must be found to enable plants large enough to handle the summer peak to utilize their equipment at other seasons of the year.

In Montana the power market is reviving owing to increased activities in the copper industry. The existing installation at Butte and Great Falls, however, is sufficient to take care of the natural expansion at those points for some time to come. Throughout the entire Intermountain region Major Bennion found evidences of intelligent efforts to devise means whereby industries could be established to utilize the large amount of potential power available in that section. Since that power must be developed in large blocks to be profitable, the preliminary investigation necessarily must be slow and painstaking. He believes that industrial uses will be found for increasing amounts of this power, but the greatest immediate promise is the electrification of sections of the transcontinental railroads. He thinks there are sections of each of the transcontinental lines where it is feasible to begin electrification and points out that this use of power carries with it much promise of expansion because, once installed, the tendency always is to add to the mileage over which electrification extends. The tendency at this time, Major Bennion asserts, is for the railroads to plan the development of their own power.

Major Bennion was impressed with the bearing the Flaming Gorge and Kremmling projects will have on flood control in the Colorado River. The Federal Power Commission is withholding action pending a report by the Colorado River Commission. Major Bennion found that there is decided sentiment in the West that the projects should be put through as early as possible because of their effect on the flood situation.

United States Building for Brazil's Fair



Architect's drawing of the official United States government building now being constructed at Rio de Janeiro for the Brazilian Centennial Exposition, which opens in September. The building is of permanent construction and will serve as the American Embassy after the close of the exposition. Frank L. Packard of Columbus is the architect and Dwight P. Robinson & Company, Inc., are the constructors. The photograph is reproduced by courtesy of Dwight P. Robinson & Company, Inc.

Electric Utilities' Daily Fuel Consumption Increases

Figures just issued by the Geological Survey show a small increase in the average daily consumption of fuels of all kinds by the electric public utility plants of the United States as compared with 1921, though the figures for coal are behind those for 1920 and 1919 and in January and February were behind last year. The tables for the three and a half years ended June 30 last follow:

Month	1919	1920	1921	1922
COAL (net tons):				
Jan.	104,000	115,600	95,900	95,300
Feb.	102,000	111,500	93,900	92,600
March	93,900	105,000	85,200	87,900
April	88,100	97,200	80,600	81,900
May	85,300	91,100	77,900	79,900
June	88,300	95,000	81,360	83,000
July	85,700	94,800	79,400	.....
Aug.	86,700	97,100	83,200	.....
Sept.	92,200	100,100	86,300	.....
Oct.	98,400	101,800	89,000	.....
Nov.	112,500	105,200	92,600	.....
Dec.	116,800	103,200	93,700	.....
Year	96,200	101,400	86,500	.....
OIL (barrels):				
Jan.	21,900	41,600	23,900	35,700
Feb.	21,900	40,300	27,900	35,600
March	20,400	34,200	27,400	30,600
April	19,400	30,400	28,100	27,500
May	23,300	29,800	27,500	27,600
June	29,000	35,900	30,500	30,400
July	32,100	38,400	33,200	.....
Aug.	34,600	38,700	37,600	.....
Sept.	37,100	40,700	39,700	.....
Oct.	39,000	37,700	38,100	.....
Nov.	41,700	32,000	38,200	.....
Dec.	40,800	30,600	38,400	.....
Year	30,300	35,900	33,000	.....
GAS (1,000 cu.ft.):				
Jan.	35,500	46,100	55,300	52,700
Feb.	47,100	45,300	52,000	57,100
March	57,000	50,800	50,100	51,600
April	62,000	60,100	62,000	61,700
May	62,100	68,400	64,300	71,400
June	66,200	75,200	69,000	78,400
July	66,400	83,700	62,400	.....
Aug.	64,500	87,400	74,700	.....
Sept.	63,400	90,500	78,900	.....
Oct.	64,400	77,600	73,600	.....
Nov.	60,700	63,600	73,800	.....
Dec.	51,000	60,490	63,300	.....
Year	58,600	67,500	65,000	.....

New York Chamber of Technology Again Suggested

A circular letter issued to the members of the New York Section of the American Institute of Electrical Engineers by Calvert Townley, its chairman, brings up again the question of forming a body in New York City which would embrace engineers of all descriptions in a common membership. Mr. Townley says:

"Many of you will recall that beginning about two years ago, a number of conferences were held between representatives of the New York Section and of other allied engineering and technical bodies in the metropolitan district at which the formation of the New York Chamber of Technology was discussed. The object of this movement was to bring together the technically trained professional men of the district in the same way that they have been brought together under organizations having various titles in other cities, namely, Philadelphia, Baltimore, St. Louis, Pittsburgh, Boston, Detroit, et al. As I recall it, the organizations represented in the metropolitan conferences some two years ago total about 15,000 members, and it is obvious that there are many opportunities for cooperation, unity of action, avoidance of duplication of work, etc., that are even more worth while in and about New York than in any other city. At the present time aside from holding joint meetings between two or more different societies there is no vehicle through which the New York professional men can act, and it would be interesting and helpful to know if the membership of the A. I. E. E. favor a revival of the effort referred to."

An expression of opinion as to the number and character of the meetings of the section is also solicited by Mr. Townley.

New Brunswick Commission for Public Ownership

The Electric Commission of the Province of New Brunswick, which is under the control of the provincial government and which built the new hydro-electric station on the Musquash River, has declared itself in favor of the principle of public ownership of public utilities and will refuse to sell the power generated at Musquash to private companies for resale at a profit. Through Dr. E. A. Smith, the chairman, and C. O. Foss, the chief engineer, the commission asserts that it is committed to this principle and stands for development and sale of power to municipalities and individuals at cost. When communities other than municipalities desire electric service and have satisfied the commission that a sufficient revenue has been pledged to pay the interest and cost of administration, the commission will undertake the necessary construction, taking the bonds of the community or district, which shall be duly authorized by act of the New Brunswick Legislature, to cover such capital cost.

The commission, while it did not build the hydro-electric station at Great Falls on the Nepisiguit River, has arranged for the extension of service into the cities of Chatham and Newcastle as well as other centers of the north shore section of New Brunswick. Part of the Province of Quebec will also be served by the Great Falls station.

Slogan Sought for Electric Trucks

At a meeting held on Aug. 9 by the automobile bureau of the New York Edison Company to consider the electric vehicle exhibit at the coming electrical show in New York City it was determined to hold a prize letter contest for the purpose of obtaining the "best slogan for electric trucks to adopt." The prizes decided on will aggregate $1,000, including a first prize of $500, a second prize of $200, a third prize of $100 and forty prizes of $5 each. It was also decided to hold an electric truck parade on Oct. 10 in connection with the electrical exposition.

Higher Costs of Underground Service Recognized

Beginning Oct. 1, the city of Providence, R. I., will pay the Narragansett Electric Lighting Company a base price of $87.69 a year for each underground-connected 6.6-amp. inverted-type series magnetite-arc lamp burning all night and every night and $65.43 for each similar aërially connected arc lamp, according to a recently signed contract for street-lighting service. Series tungsten incandescent lamps of 100 cp. will be supplied at $38.03 per year each for all-night service if fed from the underground system and at $15 per lamp when served from aërial lines. The contract term is four years with provision for indefinite continuance. The negotiations which led to this agreement have been under way for several months and have been based upon a comprehensive estimate by the company of the costs of supplying various types of lamps from overhead and underground lines and the discussion of these estimates by the city.

Departure from Normal Agreement

In its recognition of the greater expense of supplying lamps from underground service the contract is an interesting departure from the ordinary agreement lumping lamps into an average price per unit. The company estimated that the investment required for each underground arc was $298.28 and for aërially supplied arcs $134.20 each. Incandescent lamps supplied from the underground system represented an estimated outlay of $222 per lamp and when fed from aërial lines $39.88 per lamp. Upon these investment costs were determined in large measure the final prices agreed upon, although the city authorities did not accept the company's figures *in toto*. In arriving at the street-lighting investment the company's engineers segregated all equipment required for this class of service. At the generating station the street-lighting pro rata was determined on the basis of demand. In substations it was computed on the basis of relative area required by this equipment in that portion of the substation occupied by distributing apparatus plus the demand ratio of the street-lighting service applied to transmission cables, lines and portions of substations common to all classes of service. A thorough study of the costs of underground and aërial lines per foot and per lamp was also undertaken to facilitate computations of the investment between the lamps and the substations. The major items in the price list include 907 underground-connected arcs and 661 aërially connected arcs, 428 underground-connected incandescents and 7,181 aërially connected incandescents. The contract includes a fuel clause, an arrangement for pricing new types of lamps, compensation for varying hours of burning, limitation of discontinuances and other features designed to facilitate the practical handling of matters between the parties under various conditions.

Rocky Mountain Tentative Program Ready

For the combined convention of the Rocky Mountain Geographic Division of the National Electric Light Association and the Colorado Electric Light, Power and Railway Association, to be held at Glenwood Springs, Col., on Sept. 11-13, this tentative program has been issued:

MONDAY, SEPT. 11

Morning.—Welcoming address, W. G. McDonald, Mayor Glenwood Springs; address, Fred Norcross, president Colorado Electric Light, Power and Railway Association; "Timely Topics," C. N. Standard, vice-president and general manager Denver Gas & Electric Light Company; "Transportation," E. C. Stenger, receiver Denver Tramway Company; committee formation report, A. Prager.

Afternoon.—"The Banker's Relation to the Public Utilities," James C. Burger, president Hamilton National Bank of Denver; "Illumination Ancient and Modern," W. D'A. Ryan, General Electric Company; "Development of the Commercial Lighting Load," W. T. Blackwell, Westinghouse Electric & Manufacturing Company (presented by L. A. S. Wood); report of activities of the Rocky Mountain Committee on Public Utility Information, George E. Lewis, executive manager; question box and general discussion.

TUESDAY, SEPT. 12

Morning.—Address, E. P. Bacon, president Rocky Mountain Division, N. E. L. A.; "Symposium on Lighting Business Development," S. E. Doane, National Lamp Works of General Electric Company, and others; "Building Public Confidence," P. L. Thomson, advertising manager Western Electric Company; "Communication," Ben S. Read, Mountain States Telephone & Telegraph Company; general discussion.

Afternoon.—"'More and Better Business' Program and General Activities of the N. E. L. A.," J. E. Davidson, vice-president N. E. L. A.; "The Future of the Artificial Gas Industry," H. O. Lobell, Henry L. Doherty & Company; "Adequate Rates," H. B. Dwight, Colorado Public Utilities Commission; "Budgeting a Management Aid," O. A. Weller, Denver Gas & Electric Light Company; question box and general discussion.

WEDNESDAY, SEPT. 13

Morning.—"The Newspaper and the Public Utility," E. A. Bemis, president Colorado Editorial Association; Address, Rodney J. Bardwell.

New England N. E. L. A. Has Varied Program

Commercial, public relations and technical problems occupy the major portion of the program of the fourteenth annual convention of the New England Geographic Division, N. E. L. A., to be held at the Hotel Griswold, New London, Conn., Sept. 5-8. On Wednesday, Sept. 6, at 10 a. m., President C. L. Edgar will open the convention. J. B. Groce, director New England Bureau of Public Service Information, Boston, will speak upon "The Public Utilities and the Public," and the reports of the standing committees on accident prevention, customer ownership, membership, purchasing agents and taxation will be presented. Sports will occupy the afternoon, and at the evening session F. J. Stanwood will present the report of the Accounting Section, followed by an address by W. A. Jones, vice-chairman National Accounting Section, New York. The film "A Day with Thomas A. Edison" will then be shown.

Technical committees will hold a round-table discussion of their year's work on Thursday, and H. M. Parsons, chairman, will discuss the work of the rural lines extension committee. "Western Red Cedar Poles and Butt Preservation Treatments" will be the subject of a talk in the afternoon by E. L. Clark, Spokane, Wash., followed by a discussion of "Radio and Its Relation to the Central Station." This year's convention will depart from previous custom by holding the election of officers at an executive session in the evening in connection with a dinner-dance and meeting of the Public Relations Section, at which addresses will be made by Chairman W. C. Bliss of the Rhode Island Public Utilities Commission, President Frank W. Smith of the N. E. L. A. and H. T. Sands, chairman Public Relations National Section.

On Friday the morning session will be occupied by reports of the Power, Lighting and Wiring Bureaus, and the afternoon will include a talk on "How to Merchandise and Sell Electric Ranges," by P. L. Miles, Chicago, and the reports of the Rate and Electric Vehicle Bureaus. In the afternoon E. W. Lloyd, Chicago, will speak, his topic being "Electrify."

Great Lakes N. E. L. A. Program

The second annual convention of the Great Lakes Geographic Division of the National Electric Light Association, in joint meeting with the fourteenth annual convention of the Indiana Electric Light Association, will be held at the French Lick Springs Hotel, French Lick, Ind., from Sept. 27 to 30. Subjects of both technical and commercial character will be considered at this convention. Special entertainment features have been arranged for the ladies and a handicap golf tournament for the men. The Central Passenger Association has made the rate for the round trip one and a half fare. The tentative program is as follows:

Report of rural-lines committee, Eugene Holcomb, chairman Great Lakes Division, N. E. L. A.; "Merchandise Sales and Co-operation with Contractors and Dealers," John F. Gilchrist, vice-president Commonwealth Edison Company; "Desirability of Uniformity of Rate Systems," Alex Dow, president Detroit Edison Company; "Public Utilities as a National Institution," E. Hill Leith, Halsey, Stuart Company, Chicago; "The Inductive Co-ordination Situation," R. F. Pack, Northern States Power Company, and B. Gherardi, American Telephone & Telegraph Company; "Selling the N.E.L.A.," R. F. Schuchardt, chairman Technical Section, N. E. L. A.; "How the Great Lakes Division Can Help the N. E. L. A. Joint Committee on Business Development," E. W. Lloyd, Commonwealth Edison Company; "Safe Wiring" (illustrated), J. C. Langdell, Hodenpyl, Hardy & Company; "Power," Morse Dell Plain, vice-president Northern Indiana Gas & Electric Company; "Transforming Public Opinion," S. M. Kennedy, Pacific Gas & Electric Company; "Overhead Line Construction with Reference to Safety and the Safety Code" (illustrated), M. G. Lloyd, Bureau of Standards; report of women's public information committee, Miss R. E. McKee, Middle West Utilities Company; "Uniform Classification of Accounts," W. J. Myers; report of public relations committee, B. F. Lyons; round-table discussion, "Customers' Records and Billing Methods," led by J. H. Thomas of Peoria, C. H. Hansberger of Grand Rapids, P. A. Erlach of Springfield, Ill., B. F. McGuire of Chicago, and H. C. Mitchell of Indianapolis; "Store-Lighting Survey," Oliver R. Hogue and J. J. Kirk, Commonwealth Edison Company; report of educational committee, John H. Mitchell, East St. Louis Light & Power Company.

Frank W. Smith, president of the N. E. L. A., will address the association at the annual evening banquet on Sept. 28.

Scheduled N. E. L. A. Committee Meetings

The first meeting of the public policy committee of the National Electric Light Association during the present administrative year will be held at national headquarters Thursday, Sept. 21. Martin J. Insull, chairman, will preside.

The second meeting of the national executive committee will be held at headquarters Wednesday, Sept. 20, and will be presided over by Frank W. Smith. At this meeting all budgets will be passed upon and the definite program of activities for the association already under way and partially outlined at the first meeting of the executive committee will be finally approved.

Meetings of the several committees of the Public Relations Section will be held at national headquarters beginning Tuesday morning, Sept. 19, and a meeting of the executive committee of the Public Relations Section will be held at headquarters Tuesday afternoon, Sept. 19.

Brief News Notes

Niangua River Development.—A tunnel through a hill on the Niangua River, 9 miles above Hahatonka, Mo., has just been completed, and concrete work on the dam being constructed there by the Missouri Water Power Company will start immediately. This dam is the first of four which are to be constructed by the company, which expects to generate 40,000 hp. The company will furnish power to Lebanon and twenty other towns, and it is said that Jefferson City will eventually be one of the cities supplied.

Empire District Company Has Big Dam Project.—The Empire District Electric Company of Joplin, Mo., has filed with the Federal Power Commission an application for a preliminary permit for a water-power development, consisting of a dam on White River and a power house in Taney County, Mo. This dam, which will be 175 ft. high and 2,500 ft. long, will cost $10,000,000 and will take 500 men two years to build, will generate 60,000 hp., according to C. L. Proctor, vice-president of the Empire company. Transmission lines will be built to Joplin and other cities in that section of the state.

Utah Power & Light's Green River Project.—Application has been filed with the State Engineer by the Utah Power & Light Company for permission to use 5,000 sec.-ft. and to develop by storage 300,000 acre-ft. on the Green River in Daggett County. With this

water it is proposed to develop 188,000 hp. of electrical energy for use in Utah, Idaho and Wyoming. It is proposed to build a dam in the river near the Wyoming boundary and extend a pressure tunnel 19,800 ft. long southeasterly to empty into the Green River again in Red Canyon. This tunnel is to deliver water to five wheels capable of producing 37,600 hp. each under a head of 350 ft. to 415 ft.

Arkansas Valley Company Changes Name.—The name of the Arkansas Valley Railway, Light & Power Company, with headquarters at Pueblo, Col., has been changed to the Southern Colorado Power Company.

Switzerland's Coal Saving. — On account of electrification, Switzerland's consumption of coal is 800,000 tons less than before the war. From 1914 to 1920 no less than 425,000 hp. of new water power was fully utilized.

Senate Passes Salt River Bill.—The United States Senate has passed without debate, on report from its irrigation committee, the bill previously approved by the House authorizing fifty-year leases for surplus power developed by the Salt River reclamation project in Arizona.

Radio for Plant Communication.—Radio is being used to tie the main office of the San Joaquin Light & Power Company to the scattered generating plants. At present only a one-way conversation is contemplated for dispatcher service to the stations. The company also gives a radio broadcasting service at stated periods.

"White Coal" in New York.—Hydro-electric energy is saving the people of the Empire State $62,500 a day on their coal bills, according to the New York State Committee on Public Utility Information, which estimates the reduction in coal consumption due to water-power development at 12,500 tons daily and the average cost at $5 a ton.

Memphis Utility to Be Sold at Auction.—The Memphis (Tenn.) Gas & Electric Company will be sold at public auction on Aug. 28 under a federal decree, according to formal notice given by the company receivers at Memphis. The minimum price for the sale is fixed at $5,385,000. The company has been in receivers' hands since January, 1920.

"Doherty News" Reappears. — The *Doherty News*, the house organ formerly issued monthly for the benefit of the employees of Henry L. Doherty & Company and the Cities Service Company, New York, which was discontinued last year, has been revived as a semi-monthly paper, and the first number of the new series has been issued. Frank LeRoy Blanchard is editor.

Iowa Meter Committee Actively at Work.—The meter committee of the Iowa Section of the National Electric Light Association met at Keokuk recently to complete plans for districting the state and the better education of the men engaged in meter work. The committee is working in close co-operation with the engineering school at Ames to further the interests of the next short course, which has been set definitely for March 12-16, inclusive, 1923.

Tennessee Electric Power Company Plan Declared Operative.—The plan for organization of the Tennessee Electric Power Company to acquire the properties and securities of the Tennessee Power Company, Chattanooga Railway & Light Company, Nashville Railway & Light Company and Chattanooga and Tennessee River Power Company has been declared operative as of July 26.

Wapanucka Votes for Central-Station Service.—By a vote of 270 to 8 the people of Wapanucka, Oklahoma, have voted a franchise to the Public Service Company of Oklahoma to supply it with power and lighting. A municipally owned plant has been operating for several years, but has failed to give adequate service, and hence the town has turned to the central-station company for relief.

Iowa's Electric Utilities to Spend $6,750,000.—The public utilities of Iowa are spending, according to figures compiled by a state committee on public improvements, nearly $14,000,000 for enlargements and improvements. Of this amount the electric light and power companies are responsible for $6,750,000, which is to be expended for increased power-station facilities, new distributing systems and other equipment.

Pennsylvania Power & Light Now Serves Wilkes-Barre.—By the construction of a 66,000-volt transmission line from Harwood, Pa., to Wilkes-Barre the latter city has been added to the communities served directly by the Pennsylvania Power & Light Company. The new line went into service on July 24, connecting with the Ashley substation at Wilkes-Barre. It has 157 steel towers, which average about 80 ft. in height.

Long Island Utilities to Merge.—Negotiations have been concluded for the consolidation of the Nassau Light & Power Company with the Long Island Lighting Company, a combination which will give the new organization practically all the electric light and power and gas business of Long Island, N. Y., up to the New York City line in Queens County. Application to authorize the consolidation is to be made soon to the Public Service Commission.

Rural Electrification in France.—Success which has attended the operation of farmers' co-operative associations in France has led an association of farmers and peasants in the region of Saint-Martin de Londres to undertake the construction of a hydro-electric project in the gorge of the Hérault, from which thirty-seven rural districts will obtain their light and power. The development will cost 3,000,000 francs. The electricity commission of the General Council of the Department of the Seine is making a study of electrification in rural districts, but this project is the first actual effort to electrify rural areas in France.

Associations and Societies

Steinmetz and Lamme to Participate in Program of A. I. and S. E. E.—A tentative program of subjects to be discussed at the Cleveland convention of the Association of Iron and Steel Electrical Engineers on Sept. 11-15 was printed in the *Electrical World* for Aug. 12, page 343. A later announcement gives the names of those who will contribute papers. These include Dr. C. P. Steinmetz, whose subject is to be "Improvement in Efficiency of Electric Power Supply," and B. G. Lamme, who will give a "Review of Steel-Mill Electrification." Others contributing will be A. G. Witting, F. C. Watson, D. M. Petty, L. W. Heller, R. B. Gerhardt, D. B. Rushmore, F. W. Cramer, A. R. Leavitt, E. T. Moore, R. H. Bauer, F. A. Wiley, L. F. Galbraith and R. S. Shoemaker.

Coming Meetings of Electrical and Other Technical Societies

A complete directory of electrical associations is published in the *Electrical World* in the first issue of each volume. See July 1 issue for latest list.

Michigan Electric Light Association — Ottawa Beach, Aug. 21-23. Herbert Silvester, Edison Bldg., Ann Arbor, Mich.

International Association of Municipal Electricians, New Bedford, Mass., Aug. 22-25. C. R. George, Houston, Tex.

Conference of Local Electrical Leagues—Association Island, N. Y., Sept. 5-7.

New York Electrical League—Association Island, Sept. 5-7.

N. E. L. A. Geographic Divisions — New England, New London, Conn., Sept. 5-8; Rocky Mountain, Glenwood Springs, Col., Sept. 11-13; Southeastern, Atlanta, Sept. 12-15; Great Lakes, French Lick Springs, Ind., Sept. 27-30.

Pennsylvania Electric Association—Bedford Springs, Pa., Sept. 6-9. H. M. Stine, 212 Locust St., Harrisburg, Pa.

Colorado Electric Light, Power and Railway Association—Glenwood Springs, Col., Sept. 11-13.

Association of Iron and Steel Electrical Engineers—Cleveland, Sept. 11-15. J. F. Kelly, Empire Bldg., Pittsburgh, Pa.

American Electrochemical Society — Montreal, Sept. 21-23. A. D. Spillman, Columbia University, New York City.

Illuminating Engineering Society—Swampscott, Mass., Sept. 25-28. Samuel G. Hibben, 29 West 39th Street, New York.

American Institute of Mining and Metallurgical Engineers—San Francisco, Sept. 25-28. F. F. Sharpless, 29 West 39th Street, New York.

National Association of Railway and Utilities Commissioners — Detroit, Sept. 26. J. B. Walker, New York Transit Commission, New York.

Indiana Electric Light Association—French Lick Springs, Ind., Sept. 28-30. Thomas Donohue, Lafayette, Ind.

American Electric Railway Association — Chicago, Oct. 2-6. J. W. Welsh, 8 West 40th Street, New York.

Empire State Gas and Electric Association —Lake Placid, Oct. 5-6. C. H. B. Chapin, Grand Central Terminal Bldg., New York.

Association of Edison Illuminating Companies — White Sulphur Springs, W. Va., Oct. 11-14. Preston S. Millar, 80th St. and East End Ave., New York.

National Association of Electrical Contractors and Dealers—Cincinnati, Oct. 9-14. F. Johnson, 15 West 37th St.

Electric Power Club—Asheville, N. C., Oct. 30. S. N. Clarkson, 506 Laclede Gas Bldg., St. Louis.

Ontario Association of Electrical Contractors and Dealers—Toronto, Nov. 13-14. J. A. McKay, 24 Adelaide Street West, Toronto.

Commission Rulings

Municipality Acquiring Electric Plant Must Take Entire Property.—The Indiana Public Service Commission has ruled that the town of Brookville in acquiring the property of the Brookville Electric Company must pay for 9 miles of transmission line which will not be needed because of connection with another supply company. The municipality has also been compelled to assume the obligations of a contract providing that in case of sale the utility company would purchase another section of line.

Emergency Rate Reduction Justified.—A commission, the Utah Public Utilities Commission asserted in adjusting a complaint of the Utah Lake Distributing Company against the Utah Power & Light Company, is justified in ordering, as an emergency measure, an electric service company temporarily to change, modify and reduce rates and regulations affecting irrigation service when it is shown that buyers of this service are faced with an emergency rendering financial relief imperative. Rules to cover such a contingency were formulated by the commission for 1922.

Unprofitableness of Consumer's Business and His High Load Factor as Elements in Rate Making.—Dismissing a complaint made by the American Phosphorus Company against the electric rates of the York Haven Water & Power Company, the Pennsylvania Public Service Commission dwelt on the petitioner's contention that it had been compelled to close down its plant and might be forced out of business entirely. The commission ascribed this misfortune to foreign competition and prevailing economic conditions. "We are not convinced," the commission said, "that complainant's shutdown has been caused solely by increased rates for power, nor that such fact, even if established, would be sufficient in and of itself to establish a prima-facie case of unreasonableness." A claim of high load factor was answered by the assertion that the tariff complained against automatically benefited such consumers.

Commission's Power to Modify Certificate of Necessity Issued and in Force.—Establishing the principle that a certificate of public convenience and necessity granted a utility may be modified to meet changed conditions, the California Railroad Commission has ordered a division of territory between the Vallejo Electric Light & Power Company and the Great Western Power Company of California in Vallejo and vicinity. The matter came before the commission upon a complaint of the Vallejo company charging the Great Western with invasion of its territory. Certificates had been granted authorizing the two utilities to supply electricity in the same territory. The question involved was whether the commission had power to prohibit unnecessary competition or duplication of lines within such district by limiting the rights of the companies under their certificates. Admitting that the limitation of the rights of either to make extensions will result in a virtual revocation of its certificate as to part of the territory, the commission held that it has power to modify a previous order or decision at any time and that a certificate of public convenience and necessity is not a right which passes beyond all regulation or control. The Great Western company was therefore directed to make no further extensions of its lines and to construct no more distribution lines in the general territory of the Vallejo company.

Difference Between Depreciation Fund and Depreciation Reserve.—The distinction between a depreciation fund and a depreciation reserve was defined as follows by the Wisconsin Railroad Commission in proceedings affecting the Wisconsin Telephone Company: "A depreciation reserve represents the accumulated amount which the utility has reserved, generally out of its earnings, to meet the loss on retirement of property when that loss occurs. It appears as a liability account on the balance sheet of the company and is offset by whatever form of asset the reserve earnings may have been converted into. The depreciation fund represents cash or its equivalent in securities, and although the wording of the public utility law contemplates the establishment of a fund, it permits its diversion to other legitimate uses, so that there is nothing in the law which seems to contemplate that the accrued depreciation shall be offset by cash or securities."

Existence of Adjacent Underground Service Not a Bar to Lateral Extension.—Service to petitioners against the Edison Electric Illuminating Company of Boston is recommended by the Massachusetts Department of Public Utilities in a finding covering a proposed lateral extension from the company's underground lines in one of the main thoroughfares of Roslindale. The company protested against making the extension on the ground that the lateral street (Lee Hill Road) is abutted on by only three dwellings and that the cost of reaching these would be abnormal on account of the existing underground construction and permanent paving upon the intersecting main thoroughfare. The commission conceded that the expense of reaching the petitioners is somewhat excessive for the immediate revenue to be derived, but pointed out that the section of the city in question is more or less built up and that additional residences will undoubtedly be constructed in the near future upon the road. In the board's opinion, the immediate revenue expected would justify an extension under ordinary conditions, and it is held that the presence of the adjacent underground service should not debar the prospective customers on the lateral street from use of the company's facilities.

Recent Court Decisions

Ownership of Lots on Canal Implies No Right to Water for Power.—In Stebbins vs. Frisbie & Stansfield Knitting Company the Supreme Court of New York, Appellate Division, has held that the mere ownership of lots extending between a canal and a river which it parallels confers upon the lot owner no right to take water therefrom for power, nor has the lessee of a certain amount of water from a canal the prescriptive right to more. Owners of a canal for development of water power may recover as damages the value of excess power used by a lessee, but the owner of a power canal must have it of such size as to supply the amount of power therefrom which it has leased. (194 N. Y. S. 559.)*

Commission Authorized to Order Issuance of Securities to Discharge Debt Incurred in Development of Plant.—When moneys were advanced as loans to a public utility for the purpose of discharging, and were used to discharge, indebtedness incurred in the acquisition and construction of the utility's plant, the Ohio Public Utilities Commission had, by the decision of the Supreme Court of Ohio in Trumbull & Mahoning Water Company vs. Commission, authority to order the issue of stocks and bonds for the discharge or refunding of the obligations so incurred, whether incurred during or prior to the five-year period fixed in the statute. Moneys thus obtained, owing and unpaid, are not "moneys in the treasury of the public utility" (135 N. E. 449).

City Contracts Are Subject to State Police Power.—A city cannot assert, as against the state, that its contracts are protected by the inhibition of the federal constitution against impairment of contract obligations, the Supreme Court of Montana declared in City of Helena vs. Helena Light & Railway Company. While a state may preclude itself from exercise of its restrictive power over the contracts of a municipality by authorizing it to contract with a public utility for a given service for a definite period, the courts will not recognize such surrender of power unless unmistakably expressed by legislative act or necessarily to be implied from powers expressly granted. The Supreme Court, however, reversed a finding for the company, which sought to discontinue a certain railway line, declaring that the contract with the city remained valid until upset by the state, and that the agency established by the state in such proceedings was the Public Service Commission. (207 Pac. 337.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men
Engaged in all Branches of the Electrical Industry

J. F. Owens Heads Chamber of Commerce

The election of James F. Owens, vice-president and general manager of the Oklahoma Gas & Electric Company, to the presidency of the newly organized

J. F. OWENS

Oklahoma State Chamber of Commerce brings to the organization as its chief executive a man well qualified by nature and experience to fill the office. Mr. Owens was born in Aurora, Ill., in 1878 and was graduated from Kansas State University in 1901. He entered the service of the Baldwin (Kan.) Gas Company in 1905 and soon was advanced to the position of manager. Later he went to Wagoner, Okla., as local manager of the gas company, but in 1910 resigned to join the Muskogee Gas & Electric Company. After seven years he became head of this company, and in January, 1918, was selected as vice-president and general manager of the Oklahoma Gas & Electric Company, the position he now holds. Mr. Owens was not long established in Oklahoma before his public spirit was recognized, and as a result he has been called upon to serve in every civic campaign of importance. He has an unusually wide acquaintance among representative business men of the state.

H. F. Shearer, manager of the Smith's Falls (Ont.) Hydro-Electric System, has resigned and assumed a similar position with the city of Welland, Ontario.

B. F. Boynton, claim agent of the Portland Railway Light & Power Company, was elected secretary-treasurer of the Pacific Claim Agents' Association at the annual convention held in Los Angeles recently.

Col. William Kelly, the chief engineer of the Federal Power Commission, is in California making a personal inspection of water-power projects.

E. Sammann, formerly chief electrician on the Board of Public Works of the city of Sturgis, Mich., is now connected with the Indiana & Michigan Electric Company as maintenance electrician of the steam plant at South Bend, Ind.

C. H. Birdseye, chief topographer of United States Geological Survey, is making an inspection trip through the Western States. On Sept. 1 he will join the party being formed by E. C. La Rue for a trip along the Colorado River. During Colonel Birdseye's absence E. M. Douglas will be acting chief topographic engineer.

A. L. Lewis, formerly vice-president and general sales manager of the Lux Manufacturing Company of Newark, N. J., has established himself in Canton, Ohio, as a manufacturer of fuse plugs.

E. D. Knight, formerly chief electrician with the Cabin Creek Consolidated Coal Company, Rayford, W. Va., is now chief engineer of the Virginia Electric, Inc.

Valere A. Fynn, well-known designing and consulting engineer, recently succeeded in climbing Mount Victoria, Alberta, Canada. This was the first time the feat had been accomplished, and his success adds new laurels to Mr. Fynn's renown as a mountain climber. The mountain is near Lake Louise and is 11,600 ft. high. Because of its steepness and ice-covered slopes it had baffled Mr. Fynn on three previous attempts to reach the summit.

E. C. Rutz has recently been appointed superintendent of power and maintenance of the Bryant Paper Company of Kalamazoo, Mich. Mr. Rutz has had experience with the Chicago Edison Company and with the Stanley Electric & Manufacturing Company. For many years he was field engineer with the Woodmansee-Davidson Engineering Company and was appointed director of the public utilities of Kalamazoo in 1921.

R. A. Lundquist, chief of the electrical equipment division, Department of Commerce, sailed on Aug. 10 from New York for a short trip through England, Sweden and Germany to study electrical development in those countries. He is especially interested in the superpower schemes in Sweden and England and is to give close attention to the rural development in the former country. He also will study the domestic-appliance market for American manufacturers in England. This survey will cover a period of about three months.

Dr. M. E. de Margerie, director of the geological service of France, will succeed Prof. J. Cavalier, who recently returned to France, as the French exchange professor in America, lecturing at Columbia, Cornell, Harvard, Johns Hopkins, Massachusetts Institute of Technology, Pennsylvania and Yale.

Eugene Vinet, who is now associated with the Middle West Utilities Company of Chicago, was formerly connected with the Shawinigan Water & Power Company, Montreal, where for sixteen years he engaged in various engineering and organization work, including construction, designing, operation, inspection

EUGENE VINET

and standardization. In his present position Mr. Vinet assists G. W. Hamilton, supervising engineer over all companies controlled by the Middle West Utilities Company and manager of several of these properties.

E. G. Newton is to be chief engineer of the new plant which the West Missouri Power Company is building in Clinton, Mo. At the present time Mr. Newton is in charge of construction.

Arch Robison, who has been in Florida for the past year with the Southern Utilities Company, is now in charge of construction work under way for the Virginia Western Power Company at Ronceverte, W. Va.

Gordon Kribs, formerly assistant engineer with the Hydro-Electric Power Commission of Ontario and latterly engaged in the manufacture of the Kribs electric washing machine, has been appointed chief electrical engineer to the New Brunswick Power Commission.

W. Paxton Little, for many years associated with the Niagara Falls Power Company and the Canadian Niagara Power Company, has recently been appointed chairman of the Accounting Section of the Canadian Electrical Association.

Francis H. Achard, formerly associated with the Angus Company, Ltd., Calcutta, India, has joined the inspection department of the Stone & Webster Engineering Corporation at Pittsburgh, Pa.

G. P. Baldwin Is Manager G. E. Merchandising Department

G. P. Baldwin, who was recently appointed manager of the newly organized merchandising department of the General Electric Company, was made manager of the Pittsburgh office of that company about thirteen years ago. From there he was transferred to Philadelphia as district manager. Before his connection with the General Electric Company Mr. Baldwin had been engaged in the street-railway business in the capacity of road engineer of one of the large Western traction companies. Later he joined the Stanley Electric Manufacturing Company as one of its

G. P. BALDWIN

representatives on the Pacific Coast. He was born in California and was graduated from Stanford University in 1896. During the war Mr. Baldwin was on the staff of Gen. George W. Goethals at Washington.

Major H. S. Bannion, assistant chief engineer for the Federal Power Commission, has returned from a tour of inspection of power sites in Idaho and the Pacific Northwest.

H. D. Titus, formerly with McDonald & Kahn, building contractors and architects of Los Angeles, has recently been appointed district representative in the Southwest of the Square D Company, manufacturer of safety switches.

Irving M. Popkin, Detroit, has been appointed agent in Michigan for the Killark Electric Manufacturing Company, St. Louis. Until recently he was connected with the Great Lakes Electric Company, an electric jobbing firm in Detroit. Mr. Popkin is going into business for himself as a manufacturers' agent.

Boyd Candlish has been appointed manager of the Detroit branch of Herbert Morris, Inc. He was formerly chief engineer of the Herbert Morris Crane & Hoist Company, Niagara Falls, Ont., and is still acting in a consulting capacity for both companies on the design of special hoisting motors, magnetic brakes and controllers.

J. C. Foster has severed his connection with the Utica (N. Y.) Gas & Electric Company and is now with the Adirondack Power & Light Corporation, Amsterdam, N. Y.

Ernest Jones, formerly of Camaguey, Cuba, has been appointed assistant superintendent of the Butler district of the West Penn Power Company, Butler, Pa.

D. C. Green, vice-president and general manager of the Fort Smith Light & Traction Company, has been re-elected to the presidency of the Fort Smith Federated Welfare Association.

William W. Van Sant, formerly construction foreman with the Westinghouse Electric & Manufacturing Company, is now connected with the Brooklyn Edison Company in the same capacity.

R. S. Thomas, formerly assistant to the superintendent of the Water and Light Department, Blackwell, Okla., is now associated with the Benham Engineering Company, Kansas City, Mo., in the capacity of electrical engineer.

F. R. Whittlesey, former secretary of the Oregon Association of Electrical Contractors and Dealers and more recently field man for the Northwest Electrical Service League in Oregon, has left the services of the league and is now in the range sales division of the Portland Railway, Light & Power Company.

E. A. Robertson, who has been associated for the past year with the Moloney Electric Company, St. Louis, has been appointed district manager of the Chicago office of that company. Previous to his connection with the Moloney Electric Company Mr. Robertson was associated with the Westinghouse company and also with the Laclede Steel Company of St. Louis.

Joseph Paulson has recently assumed his new duties as representative of the A. G. Manufacturing Company, with headquarters in Los Angeles, succeeding A. B. Martin, resigned. Mr. Paulson has been with the Illinois Electric Company for the last seven years as purchasing agent and office manager. Prior to that time he had spent five years with the Western Electric Company in the Atlantic and Seattle districts. Mr. Paulson is a graduate of the Oregon Agricultural College and completed his training at the Westinghouse Electric & Manufacturing Company's works at East Pittsburgh, where he remained in the engineering department for a year and a half before going to the company's Atlanta office, where he was chief correspondent.

Anson H. Rees, formerly city salesman, has been made stores manager of the Illinois Electric Company in Los Angeles. Mr. Rees takes over the duties of this position after fifteen years of varied experience in the electrical industry. His first connection was with the Laclede Power Company of St. Louis, after which he completed his studies as an electrical engineer in the Missouri State University. Upon his arrival in California in 1898 he became purchasing agent for the Ventura Power Company and soon afterward was made general contract agent in charge of new business and advertising in the northern division of the San Joaquin Light & Power Corporation. For a number of years he was city salesman for the Illinois Electric Company. He will now have charge of the general offices, purchasing and service departments of the company.

W. H. Burleson Joins Ohio Brass Company

W. H. Burleson has joined the Ohio Brass Company and will give his time to sales work in the high-tension trans-

W. H. BURLESON

mission department of the business. Mr. Burleson is a native of Texas and was graduated in 1913 from the Agricultural and Mechanical College of that state. Since that time he has been connected with the Texas Power & Light Company, Dallas.

Obituary

John L. Swayze, general counsel for the New York Telephone Company and consulting counsel for the Bell Telephone Company of Pennsylvania, died suddenly of heart disease in a sanitarium in Watkins, N. Y. Mr. Swayze was fifty-four years old.

Albert Sechrist, president and general manager of the Albert Sechrist Manufacturing Company of Denver, Col., died suddenly last month after a nervous breakdown. Mr. Sechrist was a resident of Denver for more than fifty years and was considered a pioneer of the electrical industry in that city. After graduation from the University of Denver he settled at Greeley. Later he returned to Denver, where he purchased the fixture department of the Denver Gas & Electric Light Company, from which the present company is the outgrowth.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

Restoring Radio to Health

The Order-Taking Period Now Over and Salesmanship Will Be a Factor—Broadcasting Here to Stay

By David Sarnoff
General Manager Radio Corporation of America

UNTIL very recently the demand for radio apparatus has exceeded the available supply, and this condition of affairs caused an unbalancing in the market and created conditions which were undesirable from every one's standpoint. At present, however, I think it may fairly be said that the supply of radio devices and material is not only equal to but greater than the immediate demand, and I feel that this change of circumstances marks the first real "milestone" in the progress of events since the beginning of the present year.

There has been a marked decrease in the volume of new business. This was not unexpected, particularly during the summer months when outdoor life holds more attraction than indoor activities and when a great many people are away from home enjoying their vacations. But there is already tangible evidence of increased business. The curve is again climbing upward, this time in a saner and healthier manner, for the wild rush and pyramiding of orders that formerly prevailed are not part of the present activities of the distributor and dealer. I feel sure that this curve will continue to rise until in the fall of this year it will reach a position which should satisfy every legitimate manufacturer, distributor and dealer whose interest in radio is not confined to "making hay while the sun shines," but whose efforts and concern are directed toward stabilizing the radio equipment market.

Production Meets Demand

Now that we have turned the corner in the matter of production and we are able fully to meet the demands of the market, distributors of radio apparatus should, in my judgment, proceed with the marketing of their devices with the understanding that radio, like other articles of merchandise, requires intelligent selling effort. The builders of apparatus have done and are doing their part in providing the necessary equipment. The "builders of business" must now prepare to take their share of the load. If the electrical supply jobbers and dealers are

DAVID SARNOFF

to be the business builders of the radio industry, they should not view with alarm or even regret the fact that the supply of equipment begins to offset the volume of orders which came without sales effort.

A large percentage of the early demand for radio equipment came from amateurs and young enthusiasts who did much to stimulate the interest of their elders in this fascinating art. Evidence is at hand showing that present sales are not confined to the younger element but are extending to men and women in all walks of life. This fact in itself gives promise of a market which can be made large with proper sales effort and service. A reasonable stock should be built up during these months so as properly to take care of the fall trade and to avoid the uncertainties and undesirable conditions resulting from unpreparedness.

I have been told by a number of distributors and dealers that where they found a slackening in business they installed radio sets on a "trial basis" and that in the majority, if not in all, cases the sets were purchased after the period of trial. The dealer might well follow this lead and endeavor to arouse and sustain interest; for every satisfied customer in radio represents another selling agent when he talks to his neighbor about "radio" and his "set."

Moreover, radio affords the opportunity to establish a relationship between the dealer and the customer's home, and this fact should be of special significance to the electrical dealer, to whom contact with the customer's home means increased opportunities for sales not only in radio sets, radio parts and radio renewals but in the other electrical merchandise sold to the home.

Broadcasting Permanent

A practically untouched radio market lies in the small towns and rural districts. Entertainments enjoyed in cities only are now through the agency of "radio" available to the country home, the small village and the hamlet. Contact with this market can be established through the small-town electrical dealers, hardware and general merchandise stores and by installing sets in the homes of leading citizens, thereby creating interest and building up trade in the community.

Despite the many problems inherent in the situation, some of which press for an early solution, and despite the difficulties which at the moment may appear to those associated with the radio market, my faith in radio broadcasting has not been shaken in the slightest. I hold the definite conviction that radio broadcasting is here to stay and will continue to grow and that its growth will be in proportion to the service it

renders to the public. This is as it should be.

But the "order-taking" period is over. Work and intelligent sales effort should now be the aim of the radio distributor. The real radio business builder will find a market for his apparatus and his selling and service activities will be factors which will make for permanently stabilizing the radio equipment market in this second period of its development. It will be the tonic which the radio market, like all other markets, requires in order to enjoy a healthy growth.

Large Stocks Cut Profits

Dealers and Jobbers Must Not Be Tricked by Quantity Discounts —Danger of More Pyramiding

By G. W. Johnston

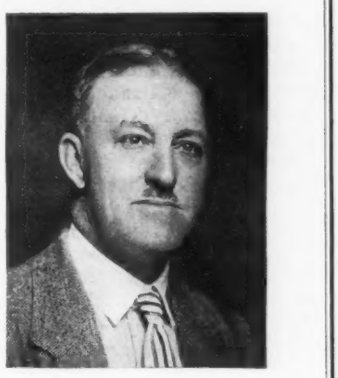
President and Treasurer
Mid West Electric Company
Omaha, Neb., and Des Moines, Iowa

VIRTUALLY every electrical jobber and dealer in the country is overstocked on one or more items. It would seem that they have forgotten or never known the relation of turnover to profit. There is not one of us who has not suffered within recent memory. Our last experience, of course, we blamed upon the war.

After the war the manufacturers, jobbers and dealers indulged in a wild orgy of buying. Orders were pyramided. The same article was ordered by the dealer from several jobbers, and each jobber placed orders for it with several manufacturers, hoping for early delivery from some one of them and not thinking of the possibility of receiving a surplus. When these articles finally became available and deliveries commenced depleted stocks were first built up and then became large. The cancellations that followed are now an old story.

But this is only part of the cause of overstocks. Quantity purchases earn the best discounts. The dealer ordering from the jobber or the jobber ordering from the manufacturer needs, for his immediate and logical stock requirements, say, ten pieces of a certain kind. He finds, however, that if he buys twenty or twenty-five pieces he will receive an additional 10 per cent discount. So, because people are not in business for their health nor from altruistic motives, this 10 per cent cries louder than turnover, and he buys the twenty or twenty-five articles where he needed only ten, and the rest go to frozen stock.

The amount of money tied up in stock grows; the interest on that money increases the overhead expense, and as an immediate consequence the profit is lessened not alone on this one article but on every other item in stock. The ultimate result is either a profitless business or higher selling prices.



G. W. JOHNSTON

Those who sell in wholesale quantities establish a differential scale of discounts to induce a larger volume of business. But the buyer, unless he has a very good reason for buying an unusually large quantity, should be extremely careful about taking advantage of greater discounts for the sake of a better price only. For rapid turnover means profit, while frozen stocks mean loss. In the matter of discounts, the legal maxim "Let the purchaser beware" may well be paraphrased. Let no one be cajoled into making foolishly large purchases by the attractive bait of higher discounts.

We approach now on a smaller scale the possibility of another period of pyramiding orders. The demand in some localities for materials to supply the present extensive building operations are exceeding the ability of local jobbers to meet it from stock. This is producing an increasing demand on certain manufacturers, and these supplies are falling behind in their deliveries.

This we have already found to be a dangerous practice, and the industry should not permit the tendency to grow. Better far to lose the profit on an order than to tie up in overstock an amount ten times as great as the profit made. Our memory of the war-time pyramiding debauch is still green, and we should not forget. For the practice will inevitably lead again to the wastes and disappointments of cancellation and of overstocking, which in turn will mean clogged turnover and loss of profits.

Survey of Business Conditions

Watt-Hour-Meter Stocks Are Ample for Present Needs

Watt-hour-meter stocks for residence use are reported ample to supply existing needs in the principal districts, despite the increasing demand brought about by completion of new homes.

Unlike the year 1920 and part of 1921, when central stations were generally out of house meters and factories were away behind in orders, supplies take better care of the demand. One authority in the meter market, however, said that he was not sure supply and demand would balance so satisfactorily one month from now, when the greater part of the past summer's construction would terminate.

The outlook in the meter market is reported promising. The increased capacity in the last year gives ample possibilities for increased production. Canadian demand provides a good export market, and even with the unfavorable conditions of exchange, the other export fields present a good demand. An improvement in exchange would open this market to a large extent.

Flexible Armored Conductor Prices May Be Increased

Flexible armored conductor prices are to undergo an upward revision—this is the well-founded opinion of certain jobbers in the East. Rumors to this effect have been current for some time, and it is known that manufacturers, too, are preparing for the higher prices.

Some jobbers in the New York territory are stocking all the armored cable that they can obtain, an *Electrical World* correspondent was informed by one of them last week.

Manufacturers are selling at present prices only for immediate shipments, they being reluctant to quote more than one month ahead.

During the earlier part of the summer many small shops, some in rooms of tenement homes, started turning out a cheap and unsatisfactory product.

Some of these "fly-by-night" manufacturers, as they are called in the market, are known to have held jobs in the textile district during the day and, with the help of their wives and children, to have operated machines in the manufacture of flexible armored conductor into the early hours of the morning.

Because of this faulty material, several fires in Brooklyn caused heavy damage to property. Contractors, who were none too careful, are now most discriminating in their selection. However, the situation is bettered, most of these shops are out of the competitive field, and dependable manufacturers hold sway.

Questioned regarding the possibility of a higher price going into effect in the near future, several leading producers said that the matter had been under consideration for some days. The amount of increase, of course, is unknown, but there are indications that it will be larger than 5 per cent. Production at present prices brings little profit, one manufacturer said.

Farm-Lighting-Plant Sales Prospects Are Good

Farm-lighting-plant sales prospects are brighter than they were two weeks ago. There has been quite a slump in the sale of these plants all over the country. Announcement of a bountiful crop last week makes the situation even brighter, as the farmer is in a cheerful state of mind and is more easily approached. Coming farm fairs are expected to stimulate business. Some companies are reported as sending out sales agents in expectation of closing many orders after the harvests are sold.

Pole-Top Lightning Arresters Are in Greater Demand

Lightning arresters of the pole-top variety are in greater demand than a month ago. They are reported responding to a good movement in the Middle West. Other good orders have been reported on the Pacific Coast and in the East, too. From the volume of inquiries coming to manufacturers, fair buying is in prospect.

No price changes have been reported up to date. It is known that many lines have been allowed to remain without lightning protection in the last few years, and some have been erected without it.

Lamp Buying in Fall Is Expected to Be Active

The fall buying movement in lamps promises to be extraordinarily good. Supplies in all types and sizes are reported sufficient to meet the heaviest demand except perhaps on some of the large-size lamps in certain sections.

In the East prospects for good fall sales are excellent. Jobbers in the New York district are finding an increasingly strong demand.

Consumer Demands Efficient Radio

Cincinnati Sales Manager Says Lessons Have Been Learned—Believes Prices of Standard Equipment Will Not Be Revised Downward for Some Time

THAT the consumer of radio apparatus has learned his lesson through buying apparatus of poor quality and that he has been educated to demand reliable products is the outstanding feature of an answer by an important radio manufacturer in Cincinnati to a questionnaire sent out by *Electrical World*. The company's sales manager writes as follows:

"The outlook for fall and winter business is, I believe, exceptionally good for efficient radio apparatus. The consumer has had his eyeteeth cut and has been educated to demand well designed and engineered apparatus that is efficient in performance. He will not be stung with sets of unknown quality or 'orphan' outfits manufactured prior to the slump. New developments and refined models are rendering the earlier types of receiving sets obsolete, and the industry is rapidly settling down to a stable and dependable foundation.

SATURATION POINT IS FAR AWAY

"There are, roughly speaking, 5,000,000 homes in this country the heads of which are paying income taxes and are potential buyers of radio equipment of the better grade. This vast potential market is far from being saturated, and from my experience in the automotive field, I know that it will be many years before the saturation point can be reached if it ever is.

"Current sales have fallen off approximately 65 per cent since June 1. This is due, in my opinion, to a combination of circumstances. Radio is, after all, a seasonable article. It is in its present-day form a source of entertainment and entertainment is in turn the basic reason for the popularity of radio with the layman. Vacations, outdoor sports, static and a general acceptance by the entire radio industry, manufacturers, jobbers and retail dealers alike, of the idea that summer months mean the death of radio sales, have all contributed to the slump that has been experienced in the past five months.

HAVE TAKEN ADVANTAGE OF LULL

"Deliveries are good. Many dealers are now receiving the goods that were ordered months ago, and to make it worse, there are no sales to move the stocks. As a result, no incentive exists for the dealer to order more. The better class of manufacturers, however, have taken advantage of the lull to increase manufacturing facilities and are preparing for the fall business that is sure to come. A number of 'fly-by-night' manufacturers invaded the field since spring and have been caught with limited capital and considerable stock (finished products) which they have been compelled to dispose of with no ready market to absorb the goods. This resulted in a price-cutting war between this class of manufacturers, and shoddy goods were unloaded on the trade at any prices that could be extracted from the merchants. Many dealers are now loaded with unsalable radio apparatus, and this fact alone is responsible in a great measure for the dealer's lack of interest today."

American Tariff Restraints on Japanese Wire Exports

Owing to the increase of the import tariff on American copper, Japan has found it almost impossible to export wire for electrical purposes. Except to China and Manchuria, Japanese exports of copper wire have fallen off considerably. The domestic demand, on the other hand, has increased, since most of the industrial factories in Japan are using electric power. The quotations for copper from Japan have, therefore, shown no remarkable change, according to reports to the Department of Commerce.

Foreign-Made Heating Devices Being Imported

Reports coming from various sources in the electrical industry indicate that there are a considerable number of foreign-made heating devices being brought into this country. Actual figures on the numbers being brought in are not available, some authorities frankly stating that they have no idea what they are, while others are positive the numbers are very great. Most of these devices, it is reported, are coming in from Germany.

Bill Would Compel Electrical Companies to Merge

A bill has been passed by the French Chamber of Deputies, and after slight changes by the Senate, authorizing the government to compel electrical generating and distributing companies to merge their interests and interconnect their lines through high-tension networks whenever the Minister of Public Works decides that this will result in better utilization of the energy, whether produced by hydro-electricity or steam. If the government does not wish to undertake the construction of the necessary lines, it can grant subsidies and compel the companies to build them.

This is the first step in the practical realization of the project for a nation-wide "superpower" system in France. Before going into effect, the bills must return to the Chamber of Deputies in its modified form. There is, however, little doubt that it will be accepted and become a law very shortly.

Report that Fans Had Very Satisfactory Season

Although unfavorable conditions during the past two months have caused poor fan sales, notably in the New York district, jobbers and manufacturers are of the opinion that the season just passed has been on the whole a very successful one.

Extreme optimism prevails among the manufacturers over prospects for next season's sales. One of the leading manufacturers states that he is planning to meet a 25 per cent increase over the 1922 demand, and producers, generally, expect to increase production. The basis of this optimism is said to be the ever-increasing use of fans in households. This business has nowhere near reached its peak. Plans are on foot to increase sales further by promoting the use of fans in cold weather for heating purposes.

Manufacturers' stocks vary. A certain representative producer has 25 per cent of this season's output on hand, but others report that they are entirely cleaned out. Ceiling fan stocks are very scarce.

Urges Wider Use of Essential Business Statistics

Electrical companies are being urged by the Fabricated Production Department of the United States Chamber of Commerce to employ a wider collection of essential business statistics.

As a means of encouraging a more general employment of statistics this department announces that it is preparing to set up a service for chambers of commerce and trade associations for the purpose of informing them as to how statistical bureaus may be established and operated.

"During our last period of inflation the lack of accurate figures on production, consumption and stocks on hand was the prime cause of the runaway markets of that time," says the department in a bulletin which it is putting out. "The hue and cry of shortage in many lines was founded not on facts, but the lack of facts." Later the release of large volumes of goods brought demoralization and loss.

New School Buildings to Aid Lighting Fixture Market

One of the most promising markets appears to be that of lighting fixtures for school buildings. Reports have been received from several sections of the country showing activity in that direction. The field seems to be fitted for the application of unit lighting fixtures, and certain manufacturers have been putting the situation squarely up to local contractors to go out and sell the equipment.

At the same time additional advantages are being offered for night school work through organizations not directly connected with educational institutions, and this is requiring the use of more room for night periods. In addition, unused portions of buildings are being put to use for educational classes.

With the coming of shorter days and the increasing use of educational buildings during periods when artificial illumination is necessary, it would seem that manufacturers and distributors of suitable lighting equipment should bend additional efforts in this direction through local electrical contractors.

Prevailing Conditions Affecting Cost and Volume

Failures Increase. — This week all four sections of the United States showed increase in failures, resulting in a total almost equal to that of two weeks ago. Defaults reported to R. G. Dun & Company this week aggregate 402, compared with 347 last week and 407 the week before that.

Bank Clearings Gain. — Margin of gain in bank clearings over last year's figures narrowed further this week, the total of $5,825,393,000 at twenty cities in the United States, as reported to *Dun's Review*, being 9.9 per cent in excess of $5,299,557,014 of a year ago. Last week the increase was 12.1 per cent.

Price Level Practically Stationary.— Wide price fluctuations in some leading markets were witnessed last month, but Dun's index number for Aug. 1 discloses practically no alteration. While certain commodities advanced appreciably, there were offsetting movements in other quarters, and index number shows a decline of 0.1 per cent.

Steel Ingot Production Decreases.— Steel ingot production continues to decrease and is now in neighborhood of 30,000,000 tons a year, against average rates of 27,000,000 tons in the first quarter of the year and 35,500,000 tons in second quarter.

Business Volume Drops $1,000,000,000.—Volume of business for week ended Aug. 9 was $7,811,000,000, marking recession of $1,005,000,000 from total of $8,816,000,000 reported for preceding week, which was swelled by end-of-the-month transactions.

Bond Market Without Feature.—The bond market was dull and devoid of interesting features last week. Prices of corporation bonds remained firm, while Liberty loans fluctuated within narrow limits at level slightly under the high for year. Foreign government loans were still under influence of strained relations between Germany and France, and most issues traded in on the Stock Exchange lost ground. Railroad issues continued in great demand and bonds of gas and electric companies showed marked strength.

Foreign Exchange a Dull Affair.— The foreign exchange market last week was a dull affair as business was considerably restricted on account of interruption of cable service with northern Europe. Bankers practically gave up doing business and only undertook urgent transactions.

Small-Motor Supplies Are Becoming Shorter Each Day

Supplies of small motors are reported as becoming shorter each day. This condition has been brought on by the steadily increasing demand during the last five weeks. Fractional-horsepower motors are not being called for as they were in the earlier part of the summer.

Extensions of plants of small and large industries are responsible for much of the demand for motors. Among these industries are textile mills of New England and the Southern States, small manufacturers all over the country and irrigation companies and canneries in the West.

Metal Market Situation

Copper Is Without Feature—Domestic Buying Mainly by Larger Electrical Companies

The copper market was without feature last week. The usual amount of copper is being sold for export, mainly in small individual lots. Inquiry is good in the domestic trade, and certain companies are trying to buy into the first quarter. They, however, are not willing to pay producers' prices, which are slightly better than 14 cents, delivered, on shipments which are far ahead.

Recently domestic buying seems to have been mainly by larger electrical companies and such wire and brass companies as have their plants situated within trucking distance of most of their customers and depend upon oil or hydro-electric service for power or else have ample coal supplies on hand.

July copper sales, foreign and domestic, are estimated by competent authorities in the trade to have been 125,000,000 lb., compared with 140,000,000 lb. for June and 210,000,000 lb. for May.

ELECTROLYTIC COPPER PRICES

Average prices in New York

	1922	1921	1920	1919	1918
Jan.	13.60	12.85	19.02	20.00	23.50
Feb.	12.97	12.79	18.61	16.91	23.50
Mar.	12.84	12.23	18.36	15.01	23.50
April	12.71	12.54	18.54	15.40	23.50
May	13.29	12.83	18.28	16.01	23.50
June	13.71	12.76	17.97	17.65	23.50
July	13.90	12.35	18.61	21.71	25.89
Aug.	.....	11.76	18.44	22.22	26.00
Sept.	.....	12.10	18.04	21.95	26.00
Oct.	.....	12.75	16.30	21.50	26.00
Nov.	.....	13.16	14.39	19.96	26.00
Dec.	.....	13.67	13.48	18.48	25.29
Average	.....	12.65	17.50	18.90	24.68

NEW YORK METAL MARKET PRICES

	Aug. 9, 1922 Cents per Pound	Aug. 16, 1922 Cents per Pound
Copper		
Prime Lake	14.00–14.25	14.00–14.25
Electrolytic	14.00	14.00
Casting	13.45	13.45
Lead, Am. S. & R. price	5.75	5.75
Antimony	5.25	5.25
Nickel, ingot	36.00	36.00
Zinc, spot	6.60	6.50
Tin, Straits	32.37½	32.20
Aluminum, 98 to 99 per cent	19.10	19.10
OLD METALS		
Heavy copper and wire	10.50–11.00	11.00–11.25
Brass, heavy	5.75– 6.25	5.75– 6.25
Brass, light	5.25– 5.50	5.25– 5.50
Lead, heavy	4.62½–4.75	4.62½–4.75
Zinc, old scrap	3.00– 3.37½	3.00– 3.37½

The Week in Trade

Prices When Quoted Are Those Reported at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for All Eastern Points

BUSINESS in electrical materials is restrained severely by the railroad strike, reports from important centers indicate. Deliveries in conduit become smaller each day, some jobbers stating that they can no longer fill orders for smaller sizes which are in much demand. Increased activity in lamps is expected because of the coming longer days. Greater interest is being taken in radio apparatus, and batteries for receiving sets are reported to be selling in larger volume. Motors are selling especially well in the smaller sizes. Fixtures, in the better grades, are attracting added interest. Appliances, particularly flat irons and toasters, are gaining attention.

New York

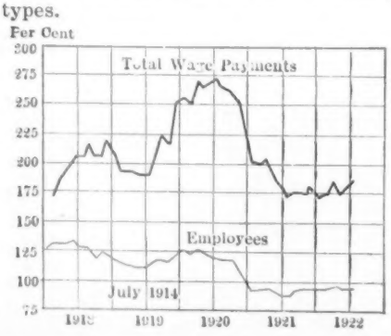
Appliance Sales Dependent on Prices—Lower Conduit Stocks—Flexible Armored Conductor Active

Demand for electrical materials continues on the even plane established two weeks ago, strikes being blamed for the hindrances. No price changes were reported. Flexible armored conductor is becoming more popular, and there is a rumor in the market that prices will soon advance. Stocks of conduit continue to become smaller. Outlet boxes are selling comparatively well.

Appliances.—Sales are largely dependent on prices at the present time. Dealers expect sales in larger volume when the vacation season ends. Washers are dull. Fans and toasters are moving a little better than two weeks ago. Flatirons are selling better.

Storage Batteries.—Industrial truck batteries are receiving only fair demand, and radio batteries are reported moving better than they have been for some time.

Lamps.—Stocks are reported plentiful and demand is for the ordinary types.



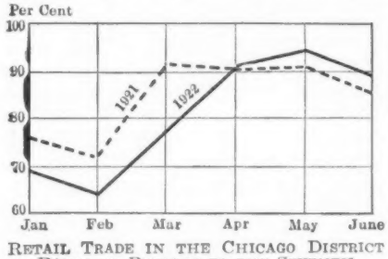
WAGE PAYMENTS IN NEW YORK STATE FACTORIES COMPARED WITH NUMBER OF WORKERS EMPLOYED. FROM MONTHLY REVIEW OF SECOND FEDERAL RESERVE DISTRICT

Fixtures.—Demand is for the better grades. Dealers are preparing for large sales in the early autumn.

Chicago

Wiring Materials Demand Steady—High Tension Manufacturers Active—Lamps Are Moving Well

Electrical trade is back to its normal stride again after termination of the street railway strike. Call for wiring materials is steady, but prices are firm owing to uncertainties involving the coal and rail strikes. Supply of smaller sizes of conduit is spotted since



RETAIL TRADE IN THE CHICAGO DISTRICT BASED ON REPORTS TO THE SEVENTH FEDERAL RESERVE DISTRICT.

shipments from manufacturers are quickly disposed of to the trade. High-tension manufacturers are active. Lamps for home lighting are moving well. Radio has not started any action as yet, but jobbers look forward to a brisk fall trade.

Wire.—Normal active flow of rubber-covered wire was again resumed after settlement of the car strike. Prices are firm and No. 14 is available in 5,000-ft. lots at $6.35 per 1,000 ft. Stocks are normal. Bare and weatherproof wire prices are stiffening along with the rise in copper. The call for this material is spotted.

Conduit.—Variations in supply with most jobbers are chiefly restricted to smaller sizes. Shipments from manufacturers are distributed rapidly since demand is still strong.

Flexible Armored Conductor.—The market has been riding along with few changes. No. 14, two-wire, single-strip, is quoted at $44 per 1,000 ft. and stocks are in fair shape.

Lamps.—Movement is normal, the most active field at the present time being that of home lighting. The mill type for industrial purposes is gaining in popularity, although jobbers state that industrial buying has not started its full swing. Active business is expected in the fall.

Dry Cells.—Uniform, steady demand is reported by most jobbers.

Radio.—Although there has been no evidence as yet of the return in popularity for radio, jobbers are wisely looking over their stocks, replacing and adding to them so as to prepare for the fall demand, which they feel will be active.

Boston

Wire Trade Extremely Brisk—Tape Sales Fair—Flexible Armored Conductor More Popular

Tone of business continues strong despite strikes. Demand for wiring materials is well sustained and rigid conduit is running low in supply. Railroad buying continues good in jobbing circles. Building contracts in New England for the week ended Aug. 8 totaled $4,700,100, or slightly below last year's corresponding week. Electrical supplies are moving less actively in Maine than earlier in the summer.

Wire.—No. 14, in 1,000-ft. lots, sells at $6.25 per 1,000 ft., and prices are open at 5,000 ft. and above. Trade is extremely brisk and the supply excellent. Weatherproof is moving slowly at 15 to 15.5 cents base. Little demand for bare copper wire is reported, and there has been little resumption of last spring's call for radio aërials to date.

Tape.—Fair sales reported, ¾-in. black in 100-lb. lots moving around 40 cents per pound according to quality. House wiring is absorbing a good deal of this material.

Flexible Armored Conductor.—In 1,000-ft. lots, No. 14 sells at $43.20 per 1,000 ft., with good supplies and very active demand.

Atlanta

Jobbers Report Fair Telephone Equipment Market—Considerable Interest Given to Refrigerators

Steady and general improvement in business is reported, despite rail and coal strikes. So far the coal strike has caused no shutdowns, although the situation will become serious if the strike continues thirty days longer. Last week's cool snap caused a falling off in volume of fan sales.

Telephone Equipment.—Jobbers report business fair to good with a brisker market expected in early fall. Stocks and shipments are satisfactory and prices are steady.

Portable Drills.—Slow at present, but orders are being placed for fall stocks. Jobbers are expecting an excellent season, owing to extensive home building and to the fact that prices on this specialty will be from 20 to 25 per cent under those of last year.

Refrigerating Equipment.—Considerable interest is being displayed, and while no sales of moment have materialized, prospects are being followed up closely. Prices are steady.

Electric Ranges.—Only fair demand is reported although the field is being worked intensively and jobbers anticipate a much improved market in the near future. One of the largest central stations in this section has recently

Market Conditions for Four Weeks Ended Aug. 12

	New York	Chicago	Boston	Atlanta	St. Louis	San Francisco	Salt Lake City-Denver	Portland-Seattle
Conduit	Active	Active	Active	Active	Active	Steady	Steady	Active
Armored cable	Active	Steady	Steady	Active	Active	Active	Steady	Active
Wire	Steady	Steady	Active	Active	Slow	Steady	Active	Steady
Sockets	Active	Steady	Steady	Steady	Slow	Steady	Slow	Active
Knobs	Steady	Steady	Steady	Steady	Active	Active	Steady	Active
Switches	Active	Active	Steady	Active	Steady	Steady	Slow	Steady
Hollow ware	Steady	Steady	Steady	Steady	Steady	Active	Active	Active
Lamps	Steady	Active	Active	Steady	Active	Steady	Active	Steady
Motors	Active	Steady	Steady	Slow	Steady	Active	Steady	Steady
Refrigerators	Steady	Steady	Slow	Active	Active	Active	Active	Steady
Soldering sets	Steady	Steady	Steady	Active	Steady	Steady	Steady	Steady
Washing machines	Steady	Steady	Active	Active	Active	Active	Active	Active
Vacuum cleaners	Steady	Slow	Active	Steady	Steady	Active	Active	Steady
Fans	Slow	Steady	Active	Steady	Steady	Steady	Slow	Slow
Trend of prices	Up	Up	Up	Up	Up	Firm	Up	Firm

reduced its rate for this class of service, which should help to boost the volume of sales.

Electric Churns.—This line is slow at present, but jobbers have good stocks on hand to take care of demand, which is expected to pick up in the early fall. Prices are steady.

Porcelain.—Dullness, reported a few weeks ago, continues. Representative prices are: "Nail-it" knobs, $15.50 per 1,000; split knobs, $15.80 per 1,000; unglazed cleats, $15.90 per 1,000; tubes, ⅞-in. x 3-in., $5.50 per 1,000—all in barrel lots.

St. Louis

Schedule Material Stocks Sufficient to Meet Increasing Demand—Wire Demand Improves

Jobbers report little change in volume of business this week. Coal and railroad conditions are holding back progress principally because they are developing a mental attitude of caution on the part of industries and the general public until future conditions can be better foretold. Conditions otherwise are favorable for considerable expansion of electrical sales.

Money is easier, and long-standing obligations are being liquidated. Jobbers' stocks are in good condition except for conduit, which is very short, and wire, which is apt to be short if slow deliveries continue.

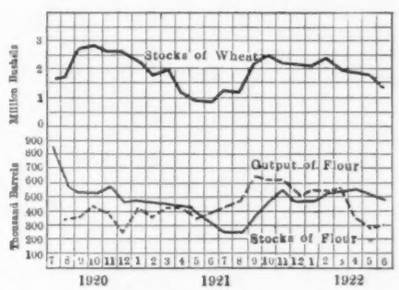
Schedule Material.—Stocks are in good shape to meet increasing demand, and sales this week were especially good. Representative socket prices are as follows, per 100 pieces in standard package lots: Key, $18.15; keyless, $16.50; pull, $33; mica weatherproof, $9; composition weatherproof, $9.65; porcelain weatherproof, $9.90. Similarly, two-piece rosettes are quoted at $10 and one-piece at $5.50. Single-pole non-indicating snap switches sell for $15.40 and single-pole indicating snap switches for $17.60.

Wire.—Demand for rubber-covered in sizes of No. 10 and smaller showed improvement during the week and deliveries are becoming more uncertain. Stocks are declining. The following prices obtain: No. 14, $6.50 per 1,000 ft.; No. 12, $9.50 per 1,000 ft.; No. 10, $12.50 per 1,000 ft.; No. 8, $15.74 per 1,000 ft.; No. 6, stranded, $32.46 per 1,000 ft.—all in lots of 5,000 ft. or more.

San Francisco

Vacuum Cleaner Sales Drop 30 per Cent—Fuse Market Is Reported Active

The freight situation is exceedingly critical owing to refusal of railway-operating unions to move freight through points protected by armed



FLOUR OUTPUT AND STOCKS AT END OF MONTH IN THE SAN FRANCISCO DISTRICT. COMPILED BY TWELFTH FEDERAL RESERVE DISTRICT.

guards. This action has closed the main gateways out of the state, 2,000 carloads of perishable freight being stalled. Unless the acute situation is relieved immediately, many interior cities will be absolutely deprived of purchasing ability.

The feature of the past month has been the increase in Oakland building permits. In 1921 the total was nearly $16,000,000; 1922 will probably run 50 per cent more.

Vacuum Cleaners.—Sales have dropped about 30 per cent. Vigorous selling is necessary for any showing.

Washers.—Sales improving, mainly because of revised models. Local stocks are good.

Sewing Machines.—Dealers report added interest in this line. Dishwashers and ironers are slow movers.

Fuses.—Increase of industrial plants and completion of large buildings is bringing on excellent fuse opportunities.

Salt Lake City–Denver

Strike Seriously Interrupts Business—Considerable Fan Stocks Held Over—Heaters Gain Interest

The rail strike has seriously interrupted freight traffic, delaying movement of shipments from factories to jobbers. All kinds of construction work is impeded on account of being unable to secure materials. Highway building in some cases has been temporarily suspended. Electrical jobbers report stocks generally in fair condition. Dealers are still trading from hand to mouth, ordering barely enough merchandise to tide them over from week to week.

Unless the strike clears up soon, fruit growers will sustain heavy losses.

Considerable fan stocks will be held over to another season.

Interest is centering in lines that will be seasonable during early fall, air heaters commanding attention. Dealers are replenishing stocks of lamps in anticipation of a pick-up in trade when the longer evenings are here.

Portland–Seattle

Jobbers Report Good Business—Rubber-Covered Wire in Demand—Lamp Cord Advances

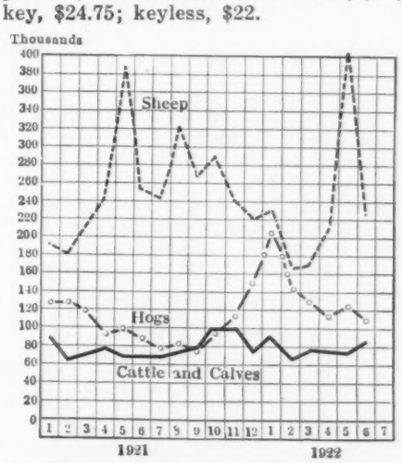
The unusually long dry spell throughout the Northwest, said in many sections to be the longest on record, was broken the latter part of the week by heavy rains. As a result the forest fire hazard has been almost entirely eliminated and much valuable timber has been saved from destruction.

Electrical jobbers report business good. Prices generally are stable with only slight adjustments taking place here and there. Thus far the railway situation has not caused any serious shortages in supplies.

Wire.—Rubber-covered is in good demand and prices remain steady. No. 14 is selling at $6.75 per 1,000 ft. in 5,000-ft. lots. No. 12 is quoted at $9.10 per 1,000 ft. in similar lots. Weatherproof is moving very well at prices which are somewhat higher.

Lamp Cord.—Advanced about 8 per cent in some sections. No. 18 cotton-covered is now quoted at from $13.49 to $15.45 per 1,000 ft. in lots of 1,000 ft. and 250 ft., respectively.

Lamp Sockets.—Movement is very good and stocks are in good shape. Prices are steady at the following approximate figures for the various types, per 100, in carton lots: Pull chain, $25, key, $24.75; keyless, $22.



RECEIPTS OF LIVE STOCK. (LOS ANGELES PORTLAND, SALT LAKE CITY, SEATTLE, AND TACOMA INCLUDED.)

Activities of the Trade

Devoted to News of the
Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

Keen Interest Shown in Radio Merchandising

Form Firm to Wholesale to Department Stores—Centralized Exhibition Scheduled for Sept. 1

ANNOUNCEMENT of the formation of a new radio merchandising firm to wholesale radio equipment to department stores was made last week. The new firm will be known as the Fourar Radio Corporation. The officers are: Alfred Fantl, president; William Dubilier, president of the Dubilier Condenser & Radio Corporation, first vice-president; Frederick Dietrich, president of C. Brandes, Inc., manufacturer of the Brandes telephone receivers, second vice-president; and Arthur Weisenberger, former director of research for the National Dry Goods Association, secretary and treasurer.

The new concern's purpose is to help conditions in the industry brought on by lack of standards, trade discounts, etc. It will handle only standard apparatus, and, according to the announcment, "will endeavor to maintain a standard which will render service to the public, to sell at prices which will enable manufacturers to guarantee deliveries, to provide a discount for the retailer that will permit profitable merchandising, and to remove complications now besetting the sale of radio so that its sale to the public shall be established on a sound, profitable basis."

President Fantl has given a definition of the significance of the corporation's title:

"The four 'R's' that stand back of Fourar Radio," he remarked, "are the initial letters of the motto and the spirit of this organization—'Reliable Radio for Representative Retailers.' As its sales force your mission is to sell merchandise having the unequivocal indorsement and backing of such manufacturing plants as the Radio Corporation of America, the Dubilier Condenser & Radio Corporation, C. Brandes, Inc., and the National Carbon Company. You are to sell this reliable, dependable radio merchandise to department stores which, in their turn, are as rich in resources and as high in repute with the American public."

To Open Radio Fair

Because New York City is the largest buying center in the United States there has been a growing need for a centralized exhibition of radio apparatus where merchants and purchasers could go to view representative apparatus. Such an exhibition, to be known as the Radio Fair, will be opened in the "Red Room" of the Hotel Imperial, New York, on Sept. 1, 1922, it is announced.

A large number of glass wallcases have been arranged in the room, and these will be rented out for a small sum to manufacturers of reliable radio apparatus.

The Radio Fair will be open to buyers only during the morning, and business cards will be accepted for admission. An expert radio engineer will be in attendance to explain and demonstrate apparatus to buyers. In the afternoon and evening the room will be open to the general public.

Arrangements have been made with Raymond Francis Yates, radio editor of the *Evening Mail*, to direct and manage the show. Only apparatus that is approved by Mr. Yates will be accepted for display.

The Radio Fair is being organized as a convenience to the many buyers who make the Hotel Imperial their headquarters while in New York. For a number of years past toy, automobile accessories and ready-to-wear shows have been held at the Hotel Imperial with great success. More than $8,000,000 in orders were placed at a recent toy fair.

H. N. Blanchard Establishes Portland (Me.) Company

The H. N. Blanchard Electrical Company, Inc., has been established in Portland, Me., by Harry N. Blanchard, formerly of the Hay-Blanchard Electrical Company of the same city.

The new concern will have its headquarters in a building at 25 and 27 Casco Street, which was purchased at a cost of approximately $40,000.

The new company is incorporated with $50,000 capital stock and will engage in a general electrical and construction business and manufacture and deal in electrical supplies. Mr. Blanchard is president, and the other officers are George H. Mountford and Eugene L. Bodge, both of Portland.

Refractory Company to Have Twelve Plants

Plans have been completed whereby the General Refractories Company, incorporated in Pennsylvania, is to acquire the entire stock ownership, assets and business of the General Refractories Company of West Virginia and other companies, the earliest incorporation of which dates back to 1900.

The new company will have twelve manufacturing plants with a capacity to produce 247,000,000 refractory bricks a year. It is one of the largest companies of its kind in the United States.

Award Contracts for Mills' Electrification

Lockwood, Greene & Company awarded contracts last week for the installation of electrical equipment in the Moore cotton mill at Valmead, N. C.; the Whitnell mill at Whitnell, N. C.; the Hudson mill at Hudson, N. C., and the Lenoir mill at Lenoir, N. C.

These mills are changing their motive power from steam to electricity and have arranged with the Southern Power Company to supply the current.

The Westinghouse Electric & Manufacturing Company received the contract for motors. Whitted & Hayward of Charlotte, N. C., representing the Movies Machine Company, received the contract for the fire pumps. Electric wiring will be done by Michael & Bivens of Gastonia, N. C.

Trade Bulletin Warns Against Use of Cheap German Irons

Cheap foreign-made electrical devices are declared to be a fire menace by Chief T. A. Clancy of the Milwaukee fire department in a statement published by the Milwaukee *Journal*. Chief Clancy referred specifically to a quantity of electric flatirons made in Germany and recently imported into New York City.

"Recently a shipment of 180,000 German-made electric flatirons was unloaded at New York," said Chief Clancy. "These irons are being retailed at about $1 each, but are so constucted as to constitute a serious fire hazard. In addition, their life is short and they are a poor 'buy' at any price. They come without a stand, and with flexible cords and attachments that do not conform to United States standards. I wish to warn the public to shun these German devices and stick to approved makes of American irons."

Last week's bulletin of an important manufacturer of battery switches warned customers as follows:

"The iron had no stand; the heating element broke under test in from three to thirty-five minutes; no replacement parts were available; the attachment plug was of wood, one-piece type; the cord had less than 3/32 in. rubber, with no 'braid covering of asbestos'; the cord was secured to the leads of the heating element in the base of the handle by brass bolts, poorly insulated, and the assembling was very bad and immediately developed short circuits on test.

"These points cover only a part of the rottenness of these German irons. Very few electrical men were fooled, but the cheap 'skin-'em-quick' crowd abounding in New York City as in other cities pushed them out to the poorer folks who thought to get a great 'buy' for a dollar and doubtless went away extolling German efficiency and deploring American robbers, etc.—that is, until they woke up with a sting. Then things looked different, and they were wiser beings.

"American goods are good enough for us!"

Ratify Wagner Electric Reorganization Plan

Stockholders Authorize 7 per Cent Cumulative Preferred Stock to Amount of $3,000,000—Property of Missouri Corporation to Be Turned Over

STOCKHOLDERS of the Wagner Electric Manufacturing Company ratified the proposed plan of reorganization of that company at a meeting held Aug. 4 by a vote exceeding 90 per cent of the total outstanding stock.

The financial program is as follows:

Authorization of 7 per cent cumulative stock to the amount of $3,000,000; bonds bearing interest at a rate not to exceed 7 per cent to the amount of $2,500,000; no-par-value common shares to the amount of 80,000 shares, of which approximately 58,270 are to be exchanged, share for share, with the holders of the present common stock, 20,000 shares to be used to accomplish the reorganization and refinancing of the company, and the balance to remain in the treasury for future use.

The $1,500,000 of preferred shares are offered to the stockholders at par, or $100 per share, with a bonus of two-thirds of one share of no-par common with each share of preferred stock taken.

By virtue of a requirement of the Missouri state law, preferred stocks cannot be issued without the consent of all common stock outstanding. This made it necessary for the company to go out of Missouri in this reorganization plan. Therefore the company has organized the Wagner Electric Corporation of Delaware, and all of the property of the Missouri corporation will be turned over to the new company.

At an organization meeting held a few days ago the board of the new company was elected as follows: V. W. Bergenthal, James M. Buick, Guilford Duncan, James H. Grover, W. A. Layman, John F. Lee, Joseph W. Lewis, Stewart McDonald, E. J. Miller, J. Herndon Smith and Harry J. Steinbreder.

Officers of the new company were elected as follows: W. A. Layman, president; A. H. Timmerman, vice-president; J. W. Westcott, secretary; V. W. Bergenthal, treasurer, and G. L. Evans, auditor.

Kimball to Continue as Manager of G. E. Small Motor Sales

Fred M. Kimball, who has been announced as manager of motor sales division of the new merchandise department of the General Electric Company, will continue to act as manager of the G. E. small motor department with headquarters at Lynn, Mass., in which capacity Mr. Kimball has been serving for many years.

The business appertaining to manufacturers who purchase motors for combination with and sale as part of their machines and machinery remains with the small motor department under Mr. Kimball's direction as heretofore.

National Carbon Company Extends Emergency Department

In order to reduce the time required for handling small and other emergency requirements of carbon brushes and to give better service to its customers, the National Carbon Company, Inc., has established two finishing plants, one at 337 East Forty-first Street, New York City, and the other at 560 West Congress Street, Chicago. These supplement the emergency department maintained for some time at the Cleveland factory.

Both of these plants carry complete stocks of all leading grades of Columbia carbon, graphite and metal-graphite brushes and are prepared to furnish all sizes equipped with standard types of shunt connections or other special methods of finishing.

Necessarily the capacity of these plants is limited, and it is the desire of the company that where delivery conditions will permit, orders for material of this kind be forwarded to Cleveland, as in the past. However, on breakdown jobs and other requirements of an emergency nature the users of brushes in the surrounding territories should avail themselves of the special facilities at New York, Cleveland and Chicago and should send their orders to the nearest plant.

Westinghouse Continues Steady Increase in Business

The Westinghouse Electric & Manufacturing Company continues the steady increase in the current year's business. Despite strikes, interrupted coal movement and temporary let-up in certain of the industries, Westinghouse, reflecting the situation in the electrical field, booked twice as much business in the first days of August as in the corresponding period of July.

The company is running ahead of schedule on manufacture of apparatus to fill the seven-million dollar contract for the electrification of the Chilean state railways. Arrangements have been made for shipping this apparatus from points where ample boat capacity is assured.

A contract has been awarded to the company at $250,000 for switching equipment for the new switch house of the Westport station of the Consolidated Gas, Electric Light & Power Company of Baltimore.

The recent increase in the demand for power in the district near Pittsburgh has made it necessary for the West Penn Power Company to increase the capacity of its Windsor plant, and orders for three large transformers and a number of high-voltage circuit breakers and electrolytic lightning arresters have been placed with the Westinghouse Company.

A new high-voltage transmission line will be run to Washington, Pa., and Charleroi, Pa. This line will be supplied by three new transformers, which are oil-insulated, water-cooled, rated at 12,000 kva., single-phase, 60-cycle, and have high voltages of 132,000 and 66,000 and a low voltage of 11,000. The new equipment which will be installed in the Washington and Charleroi stations includes at each station two 132,000-volt type G-2 oil circuit breakers and one 132,000-volt type AK electrolytic lightning arrester.

Canadian Brandes, Ltd., Reports Very Active Demand for Radio

C. Brandes, Inc., manufacturer of radio head sets, 237 Lafayette Street, New York City, has announced the establishment of its Canadian plant in Toronto, Ont. Edga Rypinski, formerly of the sales staff of the New York company, has been placed in charge of the Canadian plant. He assumed his duties Aug. 1.

The company states that since the Canadian plant has been established work has been rushed to complete the manufacturing facilities as there is a great demand for the firm's product in Canada and England. Soon after the establishment of the Canadian factory the entire output for six months was sold to Canadian customers. C. Perkins, Ltd., of Montreal, has been appointed representative of Canadian Brandes, Ltd.

The Horn & Brannen Company, 427 North Broad Street, Philadelphia, manufacturer of gas and electric fixtures, has acquired property 84 ft. x 208 ft., at 1814 Spring Garden Street for approximately $100,000. The building will be improved and an addition erected at the rear.

The Concrete Steel Company, 42 Broadway, New York City, manufacturer of steel and wire products, will commence the erection of a one-story addition to its plant at Seventeenth and Federal Streets, Camden, N. J., in the near future.

The W. R. Ostrander Company, Inc., Brooklyn, N. Y., manufacturer of electrical supplies, has taken title to the six-story factory building at 83 Clifton Place, between Grand and Classon Avenues.

The Electric Supply & Equipment Company, Hartford, Conn., will take bids at once for the construction of a four-story factory branch, 42 ft. x 60 ft., at Broadway and Church Streets, Albany, N. Y. It will cost approximately $50,000.

The General Railway Signal Company, Rochester, N. Y., has closed a contract with the Great Northern Railroad for the complete installation of automatic block signals on 165 miles of track in Montana, Idaho, Washington.

Foreign Trade Notes

PROPOSED TELEPHONE DEVELOPMENT IN SOUTH AFRICA.—The South African government, it is stated, will appropriate £500,000 for telephone development in the Union during the coming year.

RAILWAY ELECTRIFICATION IN DUTCH EAST INDIES.—The government of the Dutch East Indies, according to the *Electrical Review*, has decided to equip all the railways in Java for electrical operation. Two power stations are to be erected to supply energy for this purpose at distances of 39 miles and 27 miles respectively from Batavia. The line between Meester-Cornelis and Tandjong-Priok will be the first to be reconstructed.

MARKET FOR ELECTRIC HEATERS IN CAPE TOWN, SOUTH AFRICA.—Owing to the fact that houses and office buildings in Cape Town are not equipped with central heating facilities and in many cases have no heating facilities at all, *Commerce Reports* states there is a good demand for electric heaters.

RADIO TELEPHONY IN ARGENTINA.—No laws as yet have been passed to govern wireless telephony in Argentina, but a bill is being drafted, according to *Commerce Reports*, to regulate the use of radio sets. At present no regulations in effect prevent the sale of broadcasting and receiving sets. The latter are being manufactured locally, but are of very inferior quality and sell at from 200 to 700 pesos. French tubes are used.

PROPOSED WATER-POWER DEVELOPMENT IN CZECHOSLOVAKIA.—The construction of a new power plant at Huszt in Russinia (Ruthenia) has been planned in addition to two hydro-electric plants now under construction in Bohemia, according to *Commerce Reports*. The project calls for a canal to connect the Terebije (Talabor) and Velka Reka (Magyag) Rivers, both of which have their source in Russinia. It is estimated that 45,000 hp. can be developed.

SWEDISH POWER PLANTS.—A late report giving a general description of the state power plants in Sweden, published in English by the Royal Board of Waterfalls, has been received by the Bureau of Foreign and Domestic Commerce, Washington. Interesting data are given, particularly as to the Trollhattan-Vasteras line. Copies of the report are available for loan from the electrical equipment division or through any of the district or co-operative offices by referring to File No. 62,857.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

A Danish (No. 3216) engineering firm desires to secure connection with manufacturers of wireless telephones with a view of importing to Denmark.

A merchant in Italy (No. 3,220) desires to secure an agency for the sale of railway material and all kinds of electrical and technical goods.

PROPOSED NEW POWER STATION FOR WELLINGTON, NEW ZEALAND.—The City Council of Wellington, the *Electrical Review* states, contemplates the construction of a power station at Shag Point.

NEW ELECTRIC PLANT IN PERUGIA, ITALY.—A new electric power plant, *Commerce Reports* states, is to be built in the district of Branca, Province of Perugia, Italy. The concession will be granted to the Società Lignitifera Umbra, which will be subsidized by the government for a period of twenty years. The new plant will utilize the national supply of lignite. The station will be equipped with three units of 5,000 kw. capacity each, one of which will be held for reserve use.

EQUIPMENT FOR MANGAHAO POWER SCHEME, NEW ZEALAND.—Tenders will be received by the Public Works Department, Wellington, New Zealand, according to the *Electrical Review*, for equipment for the Mangahao power scheme as follows: Until Oct. 24 for copper wire; Nov. 21, for battery booster-transformer.

ELECTRIC EQUIPMENT FOR ELECTRIC PLANT, WELLINGTON, NEW ZEALAND.—Tenders will be received by the Public Works Department, Wellington, New Zealand, according to the *Electrical Times*, until Oct. 3 for power-house and substation transformers, electric cranes, ventilating fans, lift and 11,000-volt insulators. Particulars may be obtained at the Department of Overseas Trade, 35 Old Queen Street, S. W., London.

PROPOSED IMPROVEMENTS TO ELECTRIC PLANT IN COROWA, AUSTRALIA.—The Municipal Council of Corowa, New South Wales, Australia, the *Electrical Review* states, has decided to change the municipal electric plant from a direct-current to an alternating-current system. The cost is estimated at about £30,000.

New Apparatus and Publications

ELECTRICAL HEATING REFERENCE DATA.—The Electrical Alloy Company, Morristown, N. J., announces the publication of a bulletin entitled "Electrical Heating Reference Data," embodying the experience and suggestions of an expert on electrical heating. It covers the subject exhaustively, from the method of determining the material adapted to certain specific conditions and the proper size and length of resistance wire to be used to suggestions for the actual designing of the heating element. In this bulletin the current-carrying capacity of resistance ribbon and strip is published for the first time. These charts will be available only in this publication. To make the bulletin complete as a reference work, the publishers have included numerous reference tables for which the engineer or designer has daily need.

RADIAL ARM DRILL.—The Van Dorn Electric Tool Company, Cleveland, has recently developed a radial arm drill for millwright work, known as the "Millwright Special."

RECORDS AND REPORTS FOR INDUSTRIAL PLANTS.—"Forms, Records and Reports in Personnel Administration" is the title of a handbook edited by C. N. Hitchcock which gives a collection of representative records and reports designed to give the personnel managers of industries the kind of information which will enable them to determine policies wisely and administer them effectively. The book is published by the University of Chicago Press, Chicago.

INSTRUCTIONS FOR LIGHTING.—"Five Home Lighting Recipes" is the title of a booklet issued by the National Lamp Works of General Electric Company, Nela Park, Cleveland, which gives instructions for lighting residences.

TOOL-HANDLE SWITCHES.—Two new types of electric tool and appliance switches have been developed by the Cutler-Hammer Manufacturing Company, Milwaukee. One switch, No. 7,037, is for installation in the handles of drills, etc., and the other, No. 7,039, is designed for use in vacuum cleaners and similar appliances.

REFRIGERATED WATER SYSTEM.—"A Neglected Source of Economy" is the title of a leaflet distributed by the Armstrong Cork & Insulation Company, Pittsburgh, dealing with the use of refrigerated drinking systems in manufacturing plants.

DYNAMOMETER CHASSIS TEST SYSTEM.—The Sprague Electric Works of General Electric Company, 527 West Thirty-fourth Street, New York City, is distributing bulletin No. 48,718, describing the Sprague electric dynamometer chassis test system for car manufacturers, service stations and public garages.

New Incorporations

THE AUTLER ELECTRIC COMPANY, New York City, has been incorporated by L. and A. and B. Autler with a capital stock of $30,000 to sell electrical energy and appliances. B. B. Greller, 299 Broadway, is attorney.

THE CONTINENTAL ELECTRIC COMPANY, Newark, N. J., has been incorporated by Mauritz Larsen, North Arlington, Eric H. Anderson, Wallford A. Petersen, Belleville, and John Aanensen, Arlington.

THE WESTSIDE RURAL LIGHT & POWER COMPANY, Olympia, Wash., has been incorporated by L. E. Duval and Queen Young.

THE MARION COUNTY LIGHT & POWER COMPANY, Hannibal, Mo., has been incorporated by J. E. Weatherly, Dr. A. B. Blue, J. T. Ray and P. M. Fisher. The company is capitalized at $5,100 and proposes to erect electric transmission lines and distribute electricity.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

MACHIAS, ME.—The property of the Washington County Light & Power Company has been purchased by the Bangor (Me.) Railway & Electric Company, subject to confirmation by the courts. The sale includes a water privilege on Saco Falls on Pleasant River in the town of Columbia, where a concrete dam is about 75 per cent completed. It is planned to complete the dam, which, it is estimated, will develop about 6,000 hp. It is also proposed to extend the lines to other territory.

MANCHESTER, N. H.—The boiler house of the Gale Shoe Manufacturing Company is being remodeled so as to furnish light and power as well as heat for the plant. New equipment, including a boiler and engine, will be installed. An 80-ft. smokestack will also be erected.

GLOUCESTER, MASS.—The Gloucester Electric Company has applied to the Department of Public Utilities for permission to issue $91,600, in capital stock, part of the proceeds to be used for extensions and improvements.

DEVON, CONN.—The Connecticut Light & Power Company, Waterbury, will begin work immediately on its proposed steam-operated electric power plant at Devon, to cost about $4,000,000.

North Atlantic States

BUFFALO, N. Y.—Application has been made to the State Water Power Commission by T. Kennard Thomson and Peter A. Porter, Marine Bank Building, for permission to construct a hydro-electric plant at Foster Flats, Lower Niagara River. The cost of entire project is estimated at about $25,000,000.

BUFFALO, N. Y.—Extensions are under consideration by the Niagara, Lockport & Ontario Power Company, including the construction of a power plant, the erection of a 20-mile transmission line from Athol Springs to Dunkirk, a 50-mile double-circuit transmission line from Dunkirk to Falconer and a 30-mile line from Athol Springs to Westfield. The cost of the work is estimated at $942,620.

JAMESTOWN, N. Y.—The Western New York Electric Company contemplates increasing the capacity of the Washington Street substation and the transformer and frequency station at Falconer, a suburb of Jamestown, and erection of high-tension lines throughout Chautauqua County, at a cost of about $453,880.

LONG ISLAND CITY, N. Y.—A power plant will be built by Ridley's, Inc., 345 West Fortieth Street, New York, in connection with its new candy factory at Queens Boulevard and Moore Street, to cost about $300,000.

MEDINA, N. Y.—The Western New York Utilities Company, Inc., has issued $200,000, in bonds, part of the proceeds to be used for extensions and improvements.

NEWBURGH, N. Y.—Plans are under consideration by City Manager McKay for the installation of a new ornamental lighting system on Broadway between Mill and West Streets. It is proposed to use single-lamp standards.

NEW YORK, N. Y.—Bids will be received by the Board of Purchase, Municipal Building, until Aug. 25 for furnishing electrical material and wire to the Department of Street Cleaning. Grover A. Whalen is chairman of board of purchase.

NEW YORK, N. Y.—Bids will be received by the Board of Health of the Department of Health, 505 Pearl Street, until Aug. 23 for the construction of a transformer building on the grounds of the Riverside Hospital, North Brother Island. Royal S. Copeland is president board of health.

NEW YORK, N. Y.—Bids will be received by C. B. J. Snyder, superintendent of school buildings, board of education, Flatbush Avenue Extension and Concord

Street, Brooklyn, until Aug. 22, for furnishing materials for use of mechanics, electrical division, in various schools in the various boroughs of the city of New York.

NEW YORK, N. Y. — Bids will be received by R. W. Rodman, superintendent of plant operation, board of education, Flatbush Avenue Extension and Concord Street, Brooklyn, until Aug. 21, for installing electric ash hoists in Public Schools 6, 33, 42, and 47, borough of Brooklyn, and electric forced draft equipment in Public Schools 28 and 46, borough of Bronx.

POTSDAM, N. Y.—The St. Lawrence Transmission Company is securing the right-of-way for a transmission line from its power plant at Higley Falls to Port Howe, a distance of 25 miles, to furnish electricity to the proposed new mill of the Wayne Lumber Company.

HACKENSACK, N. J.—An electrically operated pumping plant will be installed in connection with the proposed sewage-disposal works, to cost about $485,000.

BATH, PA.—A bond issue has been approved for the installation of an electric lighting system.

CLEONA, PA.—The Worth Chocolate Company, Hershey, will build a one-story power house in connection with its new local plant.

GRANVILLE, PA.—A two-story power house, 26 ft. x 60 ft., will be erected at the local home of the Knights of Malta. Harvey T. Hauer, Lebanon, Pa., is architect.

GREENVILLE, PA. — The Greenville Steel & Iron Company, recently organized, contemplates the construction of a 15,000-hp. power plant in connection with its proposed local steel works, to cost about $2,000,000. Colonel H. P. Bope, Pittsburgh, formerly connected with the Carnegie Steel Company, heads the organization.

HAMBURG, PA.—The Hamburg Gas & Electric Company has issued $35,000 in capital stock, the proceeds to be used for extensions and improvements.

NORRISTOWN, PA. — The Merchants' Association is considering the installation of an ornamental (cluster) lighting system on Main Street, from Green to Marley Street.

NORTH WALES, PA.—The Philadelphia Suburban Gas & Electric Company will build a transmission line from Quamby to North Wales.

PHILADELPHIA, PA.—The Philadelphia Brewing Company, Fairhill and Clearfield Streets, has completed plans for the construction of a one-story power house at its plant.

PITTSBURGH, PA.—Bids are being received by the Duquesne University, Bluff Street, for a three-story school, gymnasium and power house, to cost about $150,000. A. F. Link, 407 North Craig Street, is architect.

READING, PA.—The Reading Hardware Company will build a four-story power house 50 ft. x 96 ft., in connection with an addition to its plant.

ROWENNA, PA.—The Pennsylvania Railroad Company will extend its 2250-volt transmission line to Rowenna to supply energy for a new electrically operated pumping plant.

WARREN, PA.—The Warren Light & Power Company contemplates the erection of a 33,000-volt transmission line from Warren to Tidioute, a distance of 21 miles, to cost about $50,000. A. H. Stack is manager.

WELLSVILLE, PA.—The Edison Light & Power Company is reported to be planning the construction of a transmission line to Wellsville and vicinity.

WILKES-BARRE, PA.—The villages of Conyngham, St. Johns and Beisle's are reported to be making arrangements to secure electrical service from the high-tension lines of the Pennsylvania Power & Light Company to be erected from Harwood to Wilkes-Barre.

BALTIMORE, MD.—The Consolidated Gas, Electric Light & Power Company plans to rebuild its coal-handling tower at its Spring Garden power plant, recently destroyed by fire with loss of about $25,000.

DENTON, MD.—The Eastern Shore Gas & Electric Company is erecting a transmission line from Greenwood, Del., to Denton (14 miles long), to furnish electricity in Denton, Greensboro, Ridgely and Hillsboro from its plant at Laurel, Del.

OAKLAND, MD.—The Town Council has given the West Penn Power Company, Pittsburgh, an option on the municipal electric light plant. A fifty-year franchise is also offered the company.

TERRA ALTA, W. VA.—Arrangements have been completed by the West Virginia & Maryland Power Company, a subsidiary of the West Penn Power Company, for acquiring the property of the Home Light Company. It is proposed to erect a high-tension transmission line from Cheat Haven through Kingwood to Terra Alta.

North Central States

BAY CITY, MICH.—The Michigan Central Railroad Company contemplates building a power house in connection with its proposed car shops at Bay City.

CLEVELAND, OHIO—Bids will be received at the office of purchases and supplies, City Hall, until Sept. 1, for economizers, forced and induced draft fans.

TOLEDO, OHIO — Plans for the proposed local glass manufacturing works to be erected by the Toledo-Libbey Owens Sheet Glass Company at a cost of $4,000,000, including machinery, provide for a power plant.

YOUNGSTOWN, OHIO—Plans are being prepared by the Penn-Ohio Power & Light Company to build a substation of 8,000 hp. capacity on Market Street Extension.

WINCHESTER, KY.—The Winchester Water Works Company has applied to the Federal Power Commission for permission to build a hydro-electric plant at the United States Lock and Dam, Kentucky River near Winchester.

AZALIA, IND.—The Interstate Public Service Company will build a new 500-kw. automatic substation in Azalia, to cost about $30,000. Extensions and improvements will also be made to the substation at Southport.

COLUMBUS, IND.—The Indiana Oil Refining Company will install a new electric power plant at its local refinery.

INDIANAPOLIS, IND.—The Silk Hosiery Company, North Noble Street, has filed plans for a one-story power house.

INDIANAPOLIS, IND.—Extensive improvements are contemplated by the Interstate Public Service Company to its power distributing system between Indianapolis and Louisville.

CHICAGO, ILL.—Bids will be received by W. J. Sadler, secretary of the Board of Local Improvements, until Aug. 21 for the installation of a new street-lighting system, consisting of 251 lighting units mounted on concrete standards. Shepherd & Hovey, 1623 Monadnock Block, Chicago, are consulting engineers.

SPRINGFIELD, ILL.—The Public Service Commision has granted the Central Illinois Public Service Company, Mattoon, permission to erect a 33,000-volt transmission line from Pawnee to Springfield for the interchange of power with the Illinois Power Company and has also given its approval of a contract for an interchange of power.

BIRCHWOOD, WIS.—The local plant of the Wisconsin-Minnesota Light & Power Company will be closed down and electricity will be supplied from the transmission line extending from Birchwood to Rice Lake.

SHULLSBURG, WIS.—The installation of an ornamental street lighting system, to cost about $25,000, is under consideration. W. F. Richardt, Watertown, is engineer.

FULTON, MO.—Arrangements are being made by the board of managers of the Missouri School for the Deaf for the installation of two boilers and other equipment in the power plant at the institution, for which bids have been received.

JOPLIN, MO.—The Empire District Electric Company has petitioned the Federal Water Power Commission for a preliminary permit for a water-power development on the White River, consisting of a dam, 175 ft. high and 2,500 ft. long and a power house. A transmission line will be erected to Joplin and other cities in this section of the state. The plans call for a development of 60,000 hp., at a cost of about $10,000,000.

KANSAS CITY, MO.—Bids will be received by the Fire Commissioners until Sept. 5 for fire-alarm system, including 130,000 ft. underground cable, 150 fire boxes, 29 fire stations, central exchange building, and also complete telephone and telegraph system.

LEBANON, MO.—Work will begin at once by the Missouri Water Power Company on the construction of a dam on the Niangua River, 9 miles above Hahatonka. This is the first of four dams to be built by the company in connection with a 40,000-hp. hydro-electric power development. The company plans to furnish electricity in Lebanon and to twenty other cities. Jefferson City, it is said, will eventually be one of the cities supplied. Arthur T. Nelson is president.

LYMAN, NEB.—A bond issue of $10,000 has been voted for the installation of an electric lighting system.

NEBRASKA CITY, NEB.—Work will soon begin on the erection of the transmission lines of the Nebraska City Utilities Company from Dunbar to Lorton and Otoe. The company also contemplates extending its line to Palmyra and Unadilla.

OTOE, NEB.—Bonds to the amount of $8,000 have been authorized for improvements to the electric lighting system. A transmission line will be erected from Dunbar to Otoe.

PLATTSMOUTH, NEB.—The Chicago, Burlington & Quincy Railroad Company, Omaha, will build a new power plant here, to cost about $50,000.

CANEY, KAN.—The Tri-State Electric Company, it is reported, will build a transmission line from Caney to Copan, Okla.

Southern States

ASHBORO, N. C.—The Reding Gold Mining Company, Danville, Va., plans the construction of a power house at its local properties.

SPARTANBURG, S. C.—Henry M. Earle, representing bondholders, has acquired the property of the South Carolina Light, Power & Railway Company at a receiver's sale. The company will be reorganized and extensions and improvements made.

SAVANNAH, GA.—The West Broad Street Merchants' Association has approved plans submitted by R. C. Brooks, manager of the Savannah Electric Company, for the installation of an ornamental lighting system on that thoroughfare. The plans call for eighty-three single-lamp standards, mounted with 600-cp. lamps, to cost about $12,500.

APALACHICOLA, FLA.—Bids will be received by the City Commission until Sept. 12 for equipment for a two-unit electric generating plant of 200-kw. capacity, to be operated in conjunction with the municipal waterworks system. The motive power will consist of one 100-hp. and one 150-hp. engine directly connected to generators. All communications to be addressed to F. B. Wakefield, city clerk and cashier.

JACKSONVILLE, FLA.—The City Council is considering the installation of a lighting system in Memorial Park.

JACKSONVILLE, FLA.—Bids will be received by the City Commission until Aug. 24, for a 600-kw. transformer, etc., and for a number of smaller oil-cooled transformers. R. N. Ellis is purchasing agent.

BROOKHAVEN, MISS.—Bids will be received by the Mayor and Board of Aldermen until Sept. 5 for improvements to the waterworks system, including well and pumping equipment, electric motors, control apparatus, etc. The Kramer Engineering Company, Magnolia, is consulting engineer.

COTTER, ARK.—The Dixie Power Company, which has been granted a permit by the Federal Water Power Commission to construct a hydro-electric plant on White River above Cotter, is seeking a permit to build a dam on North Fork River, east of Mountain Home.

RUSSELLVILLE, ARK.—The City Council is considering establishing a municipal electric light plant and waterworks. The cost is estimated at about $300,000.

RUSSELLVILLE, ARK.—The Arkansas Light & Power Company, Pine Bluff, is planning to build a hydro-electric plant on the Illinois River, to cost about $60,000. The project includes a power dam.

HAMMOND, LA.—The installation of an ornamental lighting system is under consideration by the Commission Council.

MADILL, OKLA.—The Madill Grain & Elevator Company plans to rebuild its power house, recently destroyed by fire with loss of about $25,000.

DALLAS, TEX.—A power house will be erected by the Allied Chemical Company in connection with its new chemical plant at Alma Street and Santa Fe Avenue.

SAN ANTONIO, TEX.—Bids will be received by the State Board of Control, Austin, until Aug. 26, for the construction of a power house at the Southwestern Insane Asylum. Phelps & Dewes, San Antonio, are architects.

Pacific and Mountain States

ABERDEEN, WASH.—Steps have been taken by the Chamber of Commerce for the installation of an ornamental lighting system on Heron Street.

AUBURN, CAL.—The Bear River Water & Power Company, care of J. L. Reynolds, P. O. Box 22, plans the construction of a hydro-electric plant in Lake Valley, with initial capacity of about 3,000 hp.

LA PORTE, CAL.—William H. Spencer has applied to the State Water Commission for permission to construct and operate a hydro-electric plant on Nelson Creek, near La Porte, for power service at his gold mining plant.

LOS ANGELES, CAL.—The Little Power & Water Company has been granted permission by the State Water Commission to construct and operate a hydro-electric power plant on Rock Creek, to cost about $350,000.

OAKDALE, CAL.—Preliminary plans are under way by the Pacific Asbestos Corporation for the erection of a new asbestos mining and manufacturing plant to include machine shop, power house, etc. W. A. Sutherland, Fresno, is interested in the company.

OAKLAND, CAL.—Plans are being prepared by G. B. McDougall, state architect, Forum Building, Sacramento, for a one-story recreation building, two-story employees' building, one-story women's shop and a power house to be erected at the Oakland State Blind Asylum on Telegraph Avenue, to cost about $70,000.

RICHMOND, CAL.—The Western States Gas & Electric Company contemplates extending its transmission lines into the Rio Dell section.

SAN BERNARDINO, CAL.—The Santa Fe Railroad Company will build a power plant at its local shops, to cost about $100,000.

SAN FRANCISCO, CAL.—The Yosemite Power Company has applied to the Federal Power Commission for permission to build a hydro-electric project in the south fork of the Tuolumne River. The company proposes to build two reservoirs, a 17-mile conduit and a power house at Ward's Ferry.

GRANGEVILLE, IDAHO—The Standard Mining Company, Warrens, Ida., contemplates the construction of a hydro-electric plant on the Salmon River, near Grangeville, for commercial light and power service and for mine operation.

WEISER, IDAHO — The Mutual Power Association has applied to the Federal Power Commission for permission to build a hydro-electric plant on Crane Creek, about 20 miles from Weiser. The plans provide for using the water for irrigation purposes after passing through the power station. It is estimated that 2,800 hp. can be developed.

SALT LAKE CITY, UTAH—The Utah Power & Light Company has applied to State Engineer for permission to use 5,000 sec.-ft. and to develop by storage 300,000 acre ft. in the Green River in Daggett County. The plans provide for a development of 188,000 hp, for distribution in Utah, Idaho and Wyoming.

ARTESIA, N. M.—The electric plant of the Pecos Valley Gas & Electric Company has been put out of commission owing to the breakdown of the engine. The City Council is considering purchasing the plant and installing a new engine.

Canada

CHARLESWOOD, MAN.—The ratepayers have voted to appropriate between $8,000 and $12,000 for the erection of an electric distributing system to supply the municipality with electricity for lighting purposes. The service will be furnished by the Winnipeg Street Railway Company.

WESTVILLE, N. S.—A petition has been presented to the Town Council asking that action be taken to secure hydro-electric power from Malay Falls.

STAMFORD TOWNSHIP, ONT.—A by-law authorizing an issue of $30,000 in debentures for extensions and improvements to the hydro-electric system of the township has been authorized by the rate payers. T. R. Stokes, Niagara Falls, Ont., is clerk.

TORONTO, ONT.—The Ontario Hydro-Electric Power Commission, it is stated, has under consideration a new 80-ft. power canal from Chippawa to Queenston, to cost about $100,000,000.

Electrical Patents

Announced by U. S. Patent Office

(Issued Aug. 1, 1922)

1,424,164. ELECTRIC MOTOR; Howard E. Hoover, Chicago, Ill. App. filed Sept. 16, 1918. Light motor for suction sweepers.

1,424,185. DEVICE FOR SIMULTANEOUSLY STARTING A PLURALITY OF INTERNAL-COMBUSTION ENGINES; Max Schafer, Stuttgart, Germany. App. filed Dec. 12, 1912. Facilitates starting engines having dual ignition system.

1,424,201. FLYWHEEL MAGNETO; August Kazenmaier, Stuttgart, Germany. App. filed March 12, 1920. Enables use of smaller-diameter flywheel.

1,424,219. WIRE-CLAMPING TERMINAL FOR LOW-VOLTAGE INSTALLATIONS; Gottlieb Steiner and Jacques Bohli, Solothurn, Switzerland. App. filed July 6, 1921. Bifurcated clamp with jaw swiveled on pin.

1,424,256. ELECTRIC-CURRENT-CHANGING MEANS; Clyde J. Myers, Indianapolis, Ind. App. filed April 4, 1918. Two slip rings added to direct-current machine for producing alternating current.

1,424,259. COOLING SYSTEM; John F. Peters, Edgewood Park, Pa. App. filed July 30, 1920. Circulation of cooling medium through core of transformers, reactors, etc.

1,424,290. CONTACT TERMINAL; Frank F. Forshee, Flint, Mich. App. filed June 25, 1921. Strap-clamp contact for heating elements.

1,424,294. SIGNALING UNIT FOR WIRELESS TELEGRAPHY; Sydney G. Frost, Twickenham, England. App. filed May 11, 1922. Emergency hand-driven high-tension generator.

1,424,300. CONTROL SYSTEM FOR SINGLE-PHASE MOTORS; Rudolf E. Hellmund, Swissvale, Pa. App. filed Feb. 13, 1917. Current-limiting reactor also used as auto-transformer for starting.

1,424,326. BRUSH HOLDER; John E. Trostle, Wilkinsburg, Pa. App. filed July 7, 1920. Adjustable bracket surrounding armature for inclosed motor.

1,424,340. ELECTRIC HEATING APPARATUS; John C. Cavitt, Weirton, W. Va. App. filed April 27, 1921. Consists of water as element with automatic control.

1,424,346. RELAY; John Erickson, Chicago, Ill. App. filed March 14, 1919. Circuit-closing device for alternating or direct current.

1,424,365. RADIO SIGNALING; Edward H. Loftin, Washington, D. C. App. filed April 5, 1920. Horizontal antennas from which various combinations may be selected.

1,424,368. SUBSTATION TELEPHONE CIRCUITS; Talbot G. Martin, Chicago, Ill. App. filed Jan. 21, 1921. Connection of impulse sender in battery telephone circuit.

1,424,404. POWER SYSTEM; Frank O. Hartman, Mansfield, Ohio. App. filed Aug. 19, 1918. Engine-generator set for charging batteries.

1,424,443. EXTENSION FOR CONDUIT OUTLET BOXES; Carl H. Bissell, Syracuse, N. Y. App. filed June 21, 1918.

1,424,449. ROTARY ADVERTISING DEVICE; Lucius H. Cammack and Henry A. Brown, Huntington, W. Va. App. filed Jan. 4, 1922. Machine for moving advertising display cards into position at predetermined intervals.

1,424,515. RHEOSTAT; John Parkin, Jr., San Rafael, Cal. App. filed April 25, 1921. Variable resistance of the dial type.

1,424,567. WARMING DEVICE FOR CARBURETORS; Charles D. Higgins, Berkeley, Cal. App. filed March 14, 1921. Electric heater placed in manifold.

1,424,637. ELECTRIC GAGE; Edson F. Gallaudet, Providence, R. I. App. filed Sept. 26, 1917. Variable resistance controlled by float for gasoline tanks.

1,424,644. AUTOMATIC AND SEMI-AUTOMATIC TELEPHONE SYSTEM; Henry J. Herink, London, England. App. filed Nov. 10, 1916. Same connecting apparatus and junction lines used for connection between two subscribers and between subscriber and operator.

1,424,658. MOLDING; Edward S. Lidstone, Providence, R. I. App. filed Dec. 21, 1920. Two-conductor ornamental metal molding.

1,424,702. ELECTRICAL CONTROL APPARATUS; Max Wissinger, Essen, Germany. App. filed Sept. 8, 1920. Accelerating of direct-current motor.

1,424,716. TROLLEY HARP; Charles J. Dorrance, Chicago, Ill. App. filed Dec. 20, 1920. Cushioning arrangement to prevent dislodgment of wire.

1,424,717. FLEXIBLE TROLLEY HARP; Charles J. Dorrance, Chicago, Ill. App. filed Oct. 17, 1921. Shock-absorbing device.

1,424,726. ELECTRICAL COIL; Kenneth S. Johnson, Jersey City, N. J. App. filed Dec. 22, 1920. Transformer and balancing network combined in anti-side-tone telephone circuit.

1,424,731. BATTERY-TEMPERATURE CONTROLLER; Charles E. Linebarger, Chicago, Ill. App. filed March 17, 1919. Electric circuit in battery closed by thermostat.

(Issued Aug. 8, 1922)

15,429 (reissue). FLANGED ARTICLE; Edgar C. George, Norwood, Ohio. App. filed July 15, 1921. Flanged insulating bushing.

1,424,752. ADJUSTING INTEGRATING ELECTRICITY METERS; O. T. Blathy, Budapest, Hungary. App. filed Nov. 6, 1920. By means of a comparison with lamps fed from alternating-current source.

1,424,769. HYSTERESIS POWER TRANSMITTER AND BRAKE FOR PHONOGRAPH MOTOR MECHANISMS; Montford Morrison, Chicago, Ill. App. filed Sept. 5, 1916. Drives rotor at constant speed independent of motor.

1,424,805. SUBTERRANEAN SIGNALING SYSTEM; Lee de Forest, New York, N. Y. App. filed June 16, 1917. Pair of overhead base lines widely separated, each line formed between plates buried in earth and transmitting and receiving system associated with each line.

1,424,821. APPARATUS FOR INCUBATING; Charles M. Heck, Raleigh, N. C. App. filed Nov. 19, 1914. Automatic heating with device for producing moisture.

1,424,860. TRANSMISSION SYSTEM FOR AUTOMOBILES; Harry L. Tanner, Brooklyn, N. Y. App. filed Aug. 18, 1916. Electrically and mechanically interconnected dynamo-electric machines coupled to engine and load.

1,424,863. KEY-CONTROL TELEPHONE SWITCH; Don C. Walker and Bonzano Weeks, Memphis, Tenn. App. filed Sept. 26, 1921. For isolated stations along railway track.

1,424,866. METHOD AND MEANS FOR RELAYING MODULATED CARRIER WAVES; Peter I. Wold, East Orange, N. J. App. filed Feb. 17, 1917. Receiving modulated high-frequency oscillations and impressing them on a thermionic vacuum-tube modulator.

1,424,898. GAS HEATER AND VAPORIZER; Thomas W. Gorman, Spokane, Wash. App. filed Feb. 23, 1921. Heating element between carburetor and intake manifold.

1,424,899. METER-TESTING DEVICE; John L. Grayson, Morgantown, W. Va. App. filed Jan. 17, 1921. Test block installed with polyphase meters.

1,424,954. SPOOL OR HOLDER FOR COMMUTATORS; Charles A. Van Dusen, Toledo, Ohio. App. filed Sept. 20, 1920. One-piece spool provided at ends with segment clamping flanges.

1,424,979. ELECTRIC HUMIDOR; John E. Blount, Louisville, Ky. App. filed March 13, 1922. Electrodes in water well, water acting as element.

1,424,993. AUTO THEFT ALARM; John I. Crosser, Tulsa, Okla. App. filed May 8, 1920. Alarm sounded if ignition switch is closed without proper key.

1,425,001. IGNITION SYSTEM; Valère A. Flynn, St. Louis, Mo. App. filed March 7, 1918. Battery ignition system operated in conjunction with generator.

1,425,003. SWITCH; Adolph A. Gazda, Chicago, Ill. App. filed Sept. 20, 1920. For preventing noisy operation of dashpots.

1,425,011. JOINT FOR ELECTRICAL CONDUITS; James C. Herron, Chicago, Ill. App. filed May 12, 1920. May be angularly adjusted without danger of wearing the insulation of wire.

1,425,034. PORTABLE ELECTRIC LIQUID HEATER; Oran W. Montgomery, Lakewood, Ohio. App. filed May 21, 1921. Water between carbon plates as element.

1,425,040. ELECTRIC HEATING IRON; Nels A. Nelson, Bode, Iowa. App. filed May 24, 1919. Carbon-arc soldering iron.

1,425,047. RECEIVER EARPIECE; Herman G. Pape, New York, N. Y. App. filed April 15, 1921. Diaphragm clamping element of greater pliability than main body.

1,425,049. ELECTRICAL ATTACHMENT PLUG; Johann G. Peterson, Hartford, Conn. App. filed June 12, 1919. Fixed polarity plug.